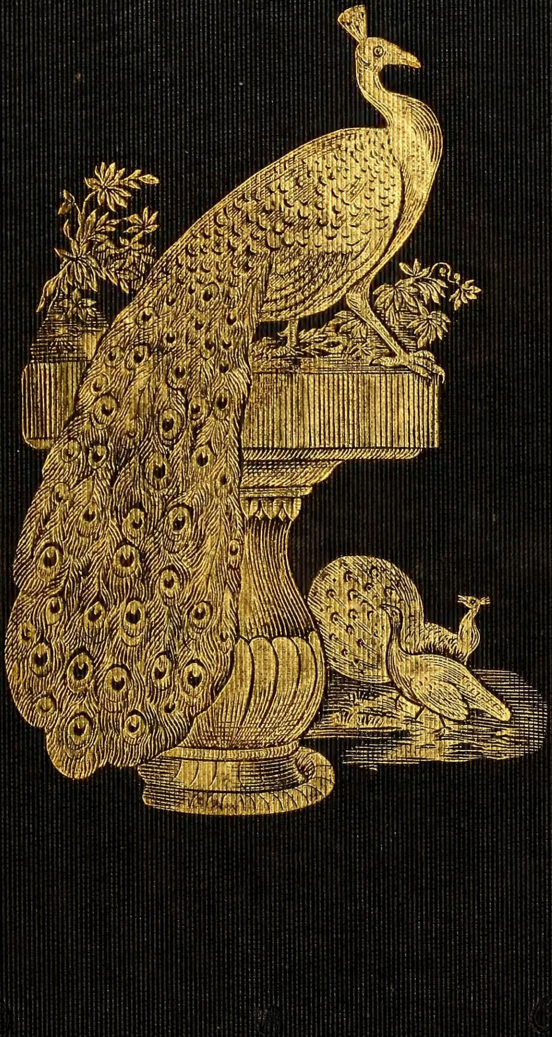

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John Hamilton.

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THE

FARMERS

BOOK.

CHAMBERSBURG P$^{a.}$
1845.

THE

FARMER'S BOOK

AND

FAMILY INSTRUCTOR,

EMBRACING THE MOST IMPORTANT OF THE RECENT SCIENTIFIC
DISCOVERIES CONNECTED WITH

PRACTICAL AGRICULTURE;

COMPREHENDING A DESCRIPTION OF THE NATURE OF SOILS, THE
NATURE AND VALUE OF MANURES, THE CULTIVATION OF
PLANTS, THE HUSBANDRY OF DOMESTIC ANIMALS,
THE CULTIVATION OF FRUITS, AND THE GENE-
RAL ECONOMY OF THE FARM; TOGETHER
WITH A VARIETY OF INFORMATION
OF VALUE TO ALL CLASSES.

DESIGNED FOR

THE FARMER

AND THE

DOMESTIC FAMILY CIRCLE.

CAREFULLY COMPILED FROM THE BEST SOURCES,
BY J. PRITTS.

CHAMBERSBURG, PA:
PRINTED FOR PURCHASERS.
1855.

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The greatest interest of this country is its Agricultural, and whoever shall zealously promote it, is a public benefactor.—*National Intelligencer.*

Agricultural Works.—We look upon a good book on Agriculture, as something more han a lucky speculation for the publisher, or a profitable occupation of his time, for the author. It is a gain to the community at large—a new instrument of national wealth. The first honor or praise, in reference to every such instrument, is, no doubt, due to the maker or inventor—but he who brings it into general use, merits also no little approbaion. It is to the more general diffusion of sound Agricultural literature among our Farmers, that we look for that more rapid development of the resources of our varied soils, which the times so imperatively demand.—*Blackwood's Magazine.*

Entered, according to the Act of Congress, in the year 1845, by
JOSEPH PRITTS,
in the Clerk's Office of the District Court of the United States in and for the Eastern
District of Pennsylvania.

INTRODUCTORY.

In presenting the present work to public notice, with the hope that it may find a favorable reception among those for whose benefit it is specially designed, it seems fit that I should introduce its contents with a few observations explanatory of the views and motives which have induced me to venture upon the somewhat hazardous enterprise. It may, at first sight, strike those acquainted with my pursuit and habits of life as rather strange that I should undertake to prepare a book for the guidance or instruction of Farmers, when it is considered that my practical knowledge of the business must, necessarily, be far short of that possessed by very many of those whom I would benefit by the reading and study of this volume.—But all sceptics and objectors, on this score, I beg leave to answer by a brief explanation.

Although my lot in life has been cast in a sphere differing widely from him whose days are employed in tilling the soil, yet this circumstance has in no degree lessened the extent and ardor of the *interest* I have felt and cherished, from earliest manhood, in the subject of Agriculture—an interest which has "grown with my growth, and strengthened with my strength," and made me a close observer of the *progress* of the art. Whilst most practical farmers have been depending mainly, if not entirely, upon a vigorous and incessant application of "bone and sinew" for the attainment of desired results in their vocation—generally, perhaps, indulging a feeling of contempt for the pretensions of "Book Farming,"—I have been noticing, with great pleasure, the inestimable achievements which Science, combined with the highest grade of intelligent Experience, and aided by unstinted expenditure of pecuniary means, have been accomplishing for the Farmer—for that great, that first of the Pursuits of our Country—

for that branch of human industry which lies at the base of all others, and which involves in its principles a depth of mystery as yet unfathomed by the reach of science; but which, strange to say, is generally looked upon as an avocation so simple in its character that it may be pursued with advantage under a mental guidance and skill that would be inadequate to the successful prosecution of the lowest mechanical branches.

I have, for many years, observed the *mistakes* of near kindred who settled down upon the soil when I entered the printing-office, *and the consequences which have resulted from those mistakes.* I have seen them with their three or four hundred acres of excellent land, abounding in the elements of fertility, going on from year to year, *laboring* like galley slaves, opening out and fencing field after field, until three or four times as much was cleared as could be properly cultivated—these fields producing, when fresh, fine crops;—then followed a *skinning* system—*taking all off and putting nothing on*—until, after years of this species of outrage—yes, more than twenty years of cropping, without returning any thing—exhausted nature refuses (and no wonder) to make a return sufficient to compensate for seed and labor—and thus, after the best energies of life are expended, the sad truth is forced upon the mind, and avowed, that the competence, the comforts, and enjoyments which *ought* to cheer the latter days of every industrious, prudent Farmer, "are as far off as ever." These instances of early mistake, of groping in the dark, and progressive blunders, though coming home to my feelings with special force, are by no means uncommon—their counterparts may be seen every where, increasing in extent as we leave the region where land maintains its highest value, where it is divided into the *smallest farms*, and where agricultural associations, experiments, books, periodicals, and scientific discoveries have been most effectual in throwing *light* in the Farmer's path, and securing him against the sad *mistakes* in the outset, which originate in ignorance, and which, if not timously corrected, will exercise a blighting influence upon all his subsequent endeavors. It has been whilst pointing out such errors as I refer to, and endeavoring to indicate the best methods of counteracting them, that I first became impressed with the idea that possibly I might perform a valuable service to a large portion of the community by getting up (to use a vulgar but expressive phrase) such a book as, in my judgment, would be calculated not only to afford highly useful hints to the Farmer of any age and possessed of any ordinary degree of information and skill in his business, but especially designed to benefit the *young* Farmer—to instruct him as to the way in which he should go—to guard him, if possible, against the great misfortune of *starting wrong*, at that highly important and critical period in his history when he "settles down in life,"—to give him, in an available form, the advice and direction which is to be gathered from the wisdom, practical experience, scientific skill, experiments and discoveries of some of the ablest minds that Europe and America have produced.

I have, for the past two or three years, contemplated undertaking the task—and in consulting many of my friends in the country upon the probability of such a work being acceptable to the class for which it is particularly designed, an affirmative opinion has been almost invariably expressed. I wish it to be clearly understood that I set up no claim to *authorship* or *originality* in this work.—If it were otherwise, I should be utterly without the confidence with which I offer it to the public as intrinsically worth far more than its cost.—I offer it as embracing as great an amount of the labors of OTHERS, *eminently qualified*, as it was in my power to compress within a volume of the present size.—If any merit at all attaches to my labors, it only resembles that which belongs to the honey bee for its skill and taste in fashioning its cells and industry in ranging extensive fields in collecting its stores. I am not quite sure that I shall be able to perfectly satisfy myself with the contents of this book, when completed.—The materials from which they are to be culled are so abundant and various that the difficulty of choosing, of deciding which is the best, is in no small degree perplexing; and yet, among all the numerous works on Agriculture and its concomitant branches, within my reach, I have seen no one which, in my judgment, is just "the thing" wanted in this region of country—a volume so comprehensive and various in its character as to present, in a convenient form, a sufficiently clear view of first principles and such practical details as seem essential in order to lead the mind of the Farmer *willing to learn*, to a knowledge of the valuable truths which it is important he should know, inasmuch as they bear directly upon the means by which he lives, and through which he may confer lasting benefits upon his children and the community.

To supply this deficiency, therefore, is my aim in the present work.—I shall give no index or table of contents, taking it for granted, that every one who becomes the owner of a copy will do both it and himself the justice to *read* it, and not only this, but to *study* its principles, examine carefully its statements and suggestions, exercise his own judgment, compare with his own experience, and, as far as possible, test their truth and value by practical experiments.

The first thing to be aimed at, in a work like this, appears to me to be a description of the Nature of Soils—an explanation of the different elements of which they are composed, and the properties pertaining to each.—This may be regarded as the very A B C, the first lesson for one desiring to learn the mystery and art of an Agriculturist; and yet how few of those who think they are masters of the science have ever acquired this indispensable knowledge—how very few know any thing about it! My first object, then, is to supply the means of instruction upon this point, which can be obtained from no sources more competent to furnish them than those opened up to the world by such public benefactors as Sir Humphrey Davy, Prof. Johnson, Liebig, etc., etc., whose eminent abilities have been directed in these praiseworthy channels with signal success. This branch, therefore, will be found occupying a prominent place in the following pages.—It is submitted with a single farther remark, by way of caution. It is to be feared, that most readers will be apt to tire or become discouraged by the learned phraseology and scientific terms which are necessarily employed in developing the subject; but I would advise such to *persevere* until all is mastered and rendered familiar—the *young*, at least, will have no difficulty in accomplishing the task.—It is, as already remarked, the *first lesson* in the Farmer's school, and cannot, therefore, be omitted without rendering his education defective.

Next in importance to a knowledge of the nature of the soil upon which the husbandman expends his labor, unquestionably comes the subject of *Manures*, or those fertilising applications without which, in some form or other, productiveness cannot be secured. This, therefore, occupies the second principal section, and is also entitled to the reader's most careful and thorough *study*. Having referred to these two prominent features of this work, I leave the reader to make his way through all that follows, with the promise that he cannot fail to find, in the great variety of topics brought to view, much to interest him as a reader, if not to greatly subserve his interest, by being adopted in the regulation of his practice.

JOS. PRITTS.

Chambersburg, May, 1845.

In connection with the foregoing observations, (the editorial prerogative will be exercised for the future,) we introduce an extract from an able public journal:—

"Of all the various branches of American literature, there is none whose progressive developement we watch with a deeper interest, and certainly none is more important, than that which seeks to interpret the laws of nature in their relations to Agriculture, and to bring our sadly imperfect and disjointed systems of husbandry into harmony with the discoveries of science. The modes of farming which generally prevail in this country, belong more appropriately to a rude and barbarous age than to the present advanced period of civilization and general scientific knowledge. The mass of our Farmers do not realise the necessity, much less comprehend the advantages to themselves, of that intellectual culture which they readily perceive to be requisite in other, and, as they are often most erroneously regarded, higher occupations. To fit a young man for the profession of a Doctor, Lawyer or Clergyman, an *education* is thought to be indispensable; while to qualify one to discharge the duties of a Farmer, little more is thought to be necessary in the way of learning than a slight smattering of the elementary branches hitherto very inadequately taught in our common schools. To read, write and 'cypher,' is all that the boy, devoted to agricultural pursuits, is taught to aspire to, and a learned Farmer is deemed almost as great an incongruity as a learned horse. And yet there is no human occupation which affords a wider scope for scientific knowledge, or, when viewed in a just and proper light, offers stronger inducments to its acquisition. It is as true of farming as of any other business that, other things being equal, the profits are in proportion to the extent of information in him who directs its varied operations; and hence a thorough education — the more thorough the better — is not only as useful but as imperatively necessary to the Farmer as to any other man. Of course we do not mean to say that the education of the Farmer should be the *same* as that of the Lawyer, Clergyman, etc., but only that it should include an equally thorough intellectual discipline, and an extensive acquaintance with the sciences which have a direct bearing upon his occupation. True, a man may till the earth, and sometimes very successfully, without such an education, and so an uneducated man *may* be a useful as well as a successful Clergyman or Lawyer; but we still maintain that, other things being equal, he would do still better if his mind were well disciplined by study and improved by an extensive acquaintance with the laws of nature and of science.

"There are indications not to be mistaken, that public opinion, in this matter, is undergoing a healthful change. Agriculture as a pursuit is gradually but surely working its way to the high position among human occupations which its intrinsic importance fully entitles it to hold; and we rejoice in the conviction that this revolution, like others that are fraught with blessings to mankind, can never go backward, but is destined to advance with a constantly accumulating force until the mists of prejudice and ignorance shall be dispelled by the light of nature and the discoveries of science. The needed reformation has received a strong impetus from the example of a new class of Farmers, not very numerous but constantly increasing, which has sprung into existence within the last ten or fifteen years. We mean the class who, with high and noble aims, have devoted the wealth obtained in other pursuits to the cultivation of the earth, and whose liberal views and wise foresight are generally manifested in the enthusiasm with which they welcome the light which science is continually shedding in their path. Under the influence of their example and of the spirit of investigation which marks the present age, our Farmers, generally, are awakening to a more just appreciation of the dignity of their calling and a clearer perception of the high and noble ends to which all their labors should be devoted.

"Among the indications that a new era in farming is about to dawn upon our country is the increasing demand for agricultural books and periodicals. It is not many years since the first agricultural paper was established in this country, under numerous discouragements, and without a single subscriber. Now there are some eight or ten, we believe, if not a greater number, in various parts of the United States, many of which are conducted with great ability and well supported."

The "*Quarterly Journal of Agriculture and Science*," published at Albany, N. Y., has lately been added to the number of periodicals.—In an article devoted to the question, "What can be done for American Agriculture?" we find the following admirable and appropriate passages:—

"The Farmer must acquaint himself with the principles of his art. Its foundation is laid in knowledge, and its successful practice depends upon individual skill. Of late years the sciences have laid open vast resources for the Farmer.—Geology, Botany, and especially Chemistry, have already taken rapid steps towards revolutionising the practice of agriculture. It no longer answers for a man to quote his father as the best authority. We must go higher now and follow the laws of *Nature*. Let us not be understood to mean that every Farmer must become a Chemist in the strict sense of the term, although to a certain degree he must be one. He is a practical chemist already, and he should be in a measure a theoretical one; that is, he should be a *reasoning* man in respect to the operations he carries on. He should be able to see the cause when a certain effect is produced, and to understand why the various processes which he follows are necessary and what are wrong and what are right. This does not involve necessarily an acquaintance with all the technical terms of science — terms now so much the dread of the uneducated Farmer; but he should understand the names of things he uses, and not ask the chemist who labors for his benefit to perform the impossibility of finding names for substances which a man can comprehend without finding them out.

"But it is not, after all, the names which most concern the Farmer, although, in order to be a rational one, he must understand them. The substances themselves are what he is interested in, and their application in his business. He ought to understand the relative value of different manures and their adaptedness to particular soils or crops; the preparation, improvement, and management of manures in order to secure their highest effect; the composition of soils and plants, and the effects produced by the latter growing in the former to exhaust them and render them unproductive; in fine, he must know the whole relations of the vegetable, mineral and animal world. The farm should be regarded an out-door laboratory, where every process is regulated by rule as strict as the chemist obeys in his. If we should stop to give instances to substantiate the value of this kind of knowledge, we should soon fill a volume; for there is no process in the whole art that would not bear us out. — Therefore, we need not do it. We are well aware of the prejudice which has heretofore existed against book-farming — a prejudice which is rapidly disappearing, and which was the child of ignorance.

"It cannot be possible that Agriculture, alone of all the arts, must stand aloof from the aids offered by science. All other industrial occupations owe their elevation and importance to it. And what may not farming be when the Farmer, in the full realization of the dignity of his calling, becomes the thoroughly-informed man he ought to be; and there is no sufficient reason why any man in this country should be ignorant of all the improvements that have been made in Agriculture, and equally true is it that, knowing them, there is no reason why he should not put them in practice. We are a reading people; we mingle with each other; what one does is seen and known by all. The distinction of classes is only nominal, and, in all that pertains to the common good, all meet on common ground. The interchange of thoughts and views is free as the air we breathe. The means of acquiring knowledge are cheap and abundant, and in every man's power. I say again, there is no reason why any man should not be well informed in all that concerns his business. But, before all are so, the barriers raised by prejudice and early training must be broken down, and that patriarchal respect for old customs and old usages and old ways must be done away.

"A few years ago, farming was regarded as little better than a menial service, and the Farmer was looked upon as little elevated above the serf or the slave. It was forgotten that Agriculture, the Manufacturing, and the Commercial interests, were all inseparably connected in the prosperity of the State —

or, rather, in the words of another, 'that the land and the owners, and the cultivators of the land, form the *primary essentials*, and the mercantile and manufacturing establishments the accidental adjuncts of our State; and that the ruin of the solid walls and foundation of the stupendous fabric of the greatest nation upon earth would involve in one common destruction its richest appendages and most ornamental decorations.' No country can, and this country especially cannot, foster too fondly its agricultural interests. It is now, and must continue to be, our national wealth; end this is, at the present time, eminently the direction of public feeling. To whatever cause it may be attributed — whether to the wish to be free from the anxieties and cares and insecurity of commercial life — to the sense of the greater security of the landed interests — whether to these selfish considerations, or the return of a healthy state of moral feeling, urging the conviction of the holier and happier influence of rural pursuits upon themselves and their children — to whichsoever of these circumstances it is attributed, it is a gratifying fact, that many wealthy and intelligent men are forsaking the large cities and devoting themselves to agriculture."

In view of the necessity of economising our room, we might here conclude our introductory pages, but the good sense and excellent suggestions which run through an Address delivered by Dr. Wm. Darlington, of West Chester, before the Philadelphia Agricultural Society, in October, 1844, tempt us to extract the chief portion of it.—In doing so, we, of course, could give no stronger expression of our estimate of its value, and we trust that the advice it conveys, particularly that addressed to the *young* Farmer, will not be neglected.

"On subjects so trite, and so well understood, in Eastern Pennsylvania, (says Dr. Darlington,) as are the selections of *Stock*, and the management of *Crops*, it would seem to be idle presumption in *me* to pretend to treat. The importance of introducing the best breeds of cattle — of superseding, as fast as possible, the ill-favored races which, hitherto, have been permitted to browse in our pastures, and to consume our forage — is now acknowledged by every Farmer who understands his own interests. The advantages of a judicious *rotation*, or alternation, of cultivated crops, have also been long apparent to the intelligent agriculturist: but it may be doubted whether the evils of *over-stocking* and of *over-working* — or ploughing more land than can be thoroughly manured — are sufficiently understood, or regarded, by a large portion of our Pennsylvania Farmers. These are kindred errors, induced by a mistaken ambition to seem to be doing a large business; but the practice, in each case, is a fallacious one, and has a direct tendency at once to impair the character of the stock, as well as to impoverish the land and its owner. I am satisfied, both from observation and experience, that if the cultivator of thin, or exhausted soils, would be content to plough just so much ground as he could adequately manure, he would find the products not only increased in quantity, but enhanced in quality; while the amount of labor or cost of production would be diminished, and the condition of the whole farm speedily and permanently improved. In confirmation of this, we have the fact, that within the last fifty years, in Eastern Pennsylvania, many of our farms and fields have been reduced, by division and sub-division, to one-half and even one-third of their former dimensions; and yet, by skillful management, and the faithful application of manure and lime, each of those fractional portions of the ancient domain is often made to yield a greater, and a richer product, than was afforded by the entire tract, when in the hands of our ancestors. Indeed, it may be considered a fortunate circumstance for the promotion of high and perfect culture, that we have been compelled, by the reduced size of our farms, to resort to more effectual methods of improving their condition, and thus compensating ourselves, by an augmented fertility of the soil, for the gradual contraction of its boundaries. This is the surest way to advance the science of Agriculture; it is the true and only mode in which we, of Eastern Pennsylvania, can *hold our own* in the great struggle of life, — or compete, successfully, with our brethren in newer and remoter districts. The eminent characteristic of the American people, is the vigor with which they *go ahead*, in all their pursuits. They are distinguished throughout the wide world for the ingenuity and the energy with which they devise, and prosecute improved methods of advancing their interests; and that portion of our population which may be content to remain stationary — while all the rest are pressing onward with strides of generous emulation — will assuredly be lost in the distance — or, if occasional stragglers shall be found loitering in the view, they will only be regarded as objects of compassion, or as examples to be shunned. In these our ancient, densely peopled counties, where our possessions become more costly as they are diminished in size, we can only expect a fair return for capital expended, by an increased fertility in the soil, and an enhanced skill in the management. The labor bestowed, in working a given portion of ground, must be rewarded with a better and more abundant crop. Our only resource is to have neat, tidy little farms — with small fields made in the highest degree productive — as a set off against the expanded agriculture of the distant west; while our markets must be multiplied by the permanent establishment and encouragement of all the useful branches of mechanical and manufacturing industry. These various pursuits, placed harmoniously side by side, have a salutary reaction upon each other, and diffuse reciprocal blessings over the entire community.

The *Farmer*, then, must go earnestly to work, to perform the duties of *his* department. The first step is to *enrich his land:* and this, as I have intimated, is best accomplished by *ploughing no more ground than he can thoroughly manure.* To accumulate manure must, therefore, be a leading object. The chief element of manure being vegetable matter, the production of that material on exhausted soils, is necessarily slow and tedious; but we have found a powerful and valuable auxiliary, in that process, in the application of *lime.* This mineral, judiciously applied, is known to be highly favorable to the growth of the natural family of *grasses;* and especially of the more valuable species of that family. By an increase of these grasses, we are enabled to keep a more numerous *stock*, and thereby to augment the quantity of barn-yard manure. This increase of manure enhances the beneficial influence of the lime; for lime has ever the best effects in conjunction with manure, — and the dose of that mineral may be gradually heavier, as the soil becomes richer. Thus these important agents may be made to co-operate with augmented efficiency, as the work of improvement advances. The calcarious dressings promote the increase of vegetable matter; and by that very increase, their agency is rendered still more effective and salutary.

The application of lime for the improvement of land is, perhaps, more universal, and its advantages better appreciated among the Farmers of *Chester County*, than in any other district of our country. The practice there, for many years, has been to apply quick lime — slacked so as to reduce it to a powder — on the grounds which have been prepared for Indian corn. This was long supposed to be the most appropriate time for applying it, — and it is still generally observed; but experience has demonstrated, that the application *never* comes amiss, — that it is beneficial at *all times;* and the maxim now is, *to be sure and put it on*, some time in the year. Of latter years, some of our best Farmers have adopted the practice of using lime, as a top-dressing, on their meadows and pasture grounds — for every field, in its turn, becomes a *meadow*, after the wheat crop; and I am strongly inclined to the opinion that this will be found the most advantageous mode of applying it. It mingles with the dead vegetable matter on the surface, and thus, as I suppose, improves the quality of that refuse herbage as a manure. It moreover exerts a salutary influence upon the *turf*, or sod, in stiff clay soils, by mellowing it, and otherwise improving its condition. Another advantage attending top-dressings of lime on grass lands, is, that they can be applied at the seasons of greatest leisure and convenience to the farmer. On the whole, therefore, I believe this method entitled to the preference; or, at least, is worthy of the consideration of practical agriculturists. Indeed, there is reason to believe, that *top-dressing* — even of the driest and lightest manures, or of straw, itself, produces a more signal effect upon the growth of the valuable grasses than results from the same materials when buried by the plough; and the subject deserves farther investigation.

The quantity of lime employed in agriculture, on a given surface, should be regulated by the *quality of the soil*. On sterile, or exhausted lands, where the vegetation is scant, the dressing should at first be light, yet gradually increased, as the soil improves. Thirty bushels to the acre, equally distributed, may be sufficient at the commencement: but, as vegetable matter accumulates, the quantity of lime may be enlarged, by degrees, to sixty or eighty bushels to the acre. Some of the best Chester county farms will bear even one hundred bushels per acre, with advantage; and it is remarkable, that the very soil which overlies the limestone rock, will bear the heaviest dressings of that mineral.

If I might here venture a *Chester County prescription*, for the treatment of an exhausted farm, I would say to its occupant, make your fields small, or, at least, plough only so much as you can manure well, when it comes to be laid down with wheat, timothy and clover: give your Indian corn field a moderate dressing of lime, preparatory to planting. The intermediate crop, between the Indian corn and wheat, may be oats or barley, as the quality of the land may warrant; and when the wheat comes on, apply a top-dressing of lime on the young herbage — of clover and artificial grasses — among the stubble. Proceed in this manner with each small field, or so much of each field as you can do justice to, in succession: and in the mean time, as ability permits, apply a top-dressing of lime to such other fields as are to remain a few years undisturbed by the plough. Let your *stock* be of the valuable kinds — and if they are not so, go on selecting the best, until all become of that description; — but keep no more than can be *well kept;* and so manage your stock and the vegetable products of the farm, as to make the greatest possible quantity of manure. These are, in brief, the directions which have been found to answer upon the worn out lands of *Chester;* and I presume they will prove equally successful in all cases, of similar soil and climate.

To enrich the land, and thereby to enhance the value of its products, is, of course, the leading object of the Agriculturist. To this end, his studies and his labors are mainly and properly directed. But there are other objects demanding the attention of the American Farmer, which are scarcely inferior in importance — whether considered as auxiliaries to his prosperity, or as tending to elevate his character as an intellectual being, and to fit him for the station and duties of a freeman. A Farmer *may* be an ignorant, slovenly boor — with little more endowment than the oxen he drives: or he may be — he *ought* to be — a gentleman of enlarged views, correct intelligence and cultivated taste. He should understand, not only the great leading interests of his profession, but also the economical details which pertain to thrift and contribute to success. He should, likewise, combine with an accurate knowledge of the objects of his care, a correct perception of all that is calculated to enhance the symmetry and beauty of his possessions. In reference to *economy*, in agricultural management I would here notice a matter of considerable importance, though surprisingly neglected by many Farmers: I mean the preservation of agricultural implements. These should never be left exposed to the weather when not in use. Some careless

Farmers are in the habit of leaving their ploughs, harrows, rollers, and other utensils, on the grounds where last employed — bleaching by the field side, or thrown into the corners of the fence — where they lie rusting and rotting, until required for the labors of the ensuing year. The inevitable result of such negligence, is a set of imperfect, rickety tools, and the necessity of speedily replacing them at an inconvenient expense. The man who thus manages, is sure to go behind hand; his unthrift is soon remarked. His more vigilant neighbors find him a troublesome borrower — first his implements, and then of money — which last, his impaired credit renders it difficult for him to obtain. Such has ever been the career — and such will ever be the destiny of the sloven and the sluggard. By carefully sheltering a good set of farming utensils, I am satisfied from observation and experience, they will undure, in good order, five times longer than when exposed to all the destructive vicissitudes of our climate. The *economy* of the measure is, therefore, of no mean importance. The saving of capital, as well as the satisfaction of using perfect implements, is worthy the attention of every Agriculturist. Every vehicle, tool and implement, employed on a farm, should be put under cover the moment we have done with it. There should be a suitable place for every thing, and every thing should be in its place, so that we may certainly lay our hands on it when it is wanted, by day or night.

Another important consideration which I have often urged, but which, I believe, cannot be too frequently pressed upon the notice of the Farmer, is the careful extirpation of pernicious and worthless plants, and a vigilant attention to the encroachments of all weeds, having a strange or sinister aspect. These cannot be too closely watched on their first appearance, for a season or two of neglect may allow them to gain such possession of the soil, as to cause a vexatious amount of unproductive labor, or a serious depreciation in the value of the farm. All worthless weeds should be kept in subjection as completely as possible, and especially those of a pernicious character. But in order to direct his efforts with effect, the Farmer should be able to distinguish the most injurious; and not, as I have sometimes seen him, be wasting his energies on those comparatively harmless, while far greater nuisances were flourishing around him, unnoticed and unknown. It would be well enough to know the vilest intruders *by name*, in order that he might make himself intelligible to his brother farmers; and I think every one will admit, that when he goes forth to wage war with vegetable pests, there would be a decided advantage in knowing them *by sight!* The mere clodpoll, who rejoices exclusively in the vigor of his *muscles*, may possibly object, that knowledge implies an exercise of *brain*, and therefore comes not within his province.

It is true, that some degree of observation, some portion of the faculties of perception and comparison, is requisite for the purpose in question; but I would fain hope that such an objection will not be offered by any one who occupies the position and appreciates the responsibilities of an *American Farmer*. Sure I am, it will never proceed from such as are worthy of that high calling. Let us, then, while we are enriching our lands, and striving to improve the management of our crops, let us resolve to become acquainted with *all* the objects which demand our care and attention. Let us study the history and the character of every product which affects our interest, and learn to distinguish, with intelligence and skill, between those which deserve to be fostered, and those which ought to be excluded or expelled. I would furthermore add, that while the Farmer is devoting his efforts to the primary objects of fertilising the soil, and ascertaining the best systems of culture, he should never disregard the injunctions of *good taste*, in planning his fields, planting his trees, and otherwise beautifying his premises. Beauty and profit are by no means incompatible in agriculture: they, in fact, go hand in hand. The farm which is laid out with most skill — which is under the highest culture, and the clearest of weeds, is not only the handsomest, but, at the same time, the most valuable and productive: its products are the purest, and most sought after in the market. As the best *stock* should be selected for feeding, so should the best *plants* be cultivated to feed that stock. The worthless, or less valuable portion, both of animal and vegetable products, should be made to give place to the most valuable. This should be the constant aim and object of the Agriculturist; and, like every other earthly good, it is only to be secured by continued vigilance. It must, of course, be *gradually* attained; but, by perseverance, can certainly be accomplished. The best managed farm, as I have said, will ever be the handsomest. The amount of indispensable *labor*, on farms of a given size, and in similar circumstances, is nearly equal; the difference in their condition and appearance, is the result of skill and taste in the occupants. Our incessant study, then, should be to acquire skill, and to discipline our taste. Every field, when under culture, should look like a garden; and when in grass, should be clean as a meadow. No worthless weed should be permitted to rear its head — or, at least, to mature its blossoms — not even in the lanes, the wayside, or the corners of the fences. The skillful *rotation of crops*, while it is most favorable to the production of useful plants, aids powerfully in the extirpation of pernicious intruders. It is by this system that the Agriculture of *Chester County* has attained its character for neatness and productiveness. Much, however, remains yet to be done — even in that county, and throughout Eastern Pennsylvania — in carrying out and perfecting the system of neat and tidy farming. Slovens are still to be found in every district, where trashy weeds are permitted to usurp the place of useful vegetation: but there can be no doubt, that if the example of their thrifty neighbors do not shame them into better management, the march of improvement will soon dislodge them from their incongruous position in a prosperous community. They will, of necessity, be compelled to conform to the spirit of the age, or to give place to those who feel the impetus of the times. Where society is advancing, and a generous competition pervades the mass, no man can long sustain himself, who is content to be a laggard in the race.

When the best system of culture is ascertained and established, the next thing is to adorn the premises with trees and shrubbery: but all these improvements may, and should proceed, *pari passu.* They do not interfere, and ought to commence together. Moderate sized *Orchards*, of the choicest fruit, only, should be planted without delay: and situations may often be advantageously occupied by fruit trees, which are not so well adapted to agricultural purposes. It is one of the grievances of the present day, that the few who take the pains to cultivate good fruit, are annoyed by the marauding incursions of the idle and improvident: whereas, with a little attention at the proper season, every family in the land might have an ample supply at their own doors, of those tempting delicacies which now incite the rude and thoughtless to trespass on their neighbors. The correction of this evil would be found to be an important guard and outpost, to the minor morals of the community; and it can only be effectually accomplished by universal planting.

The first leisure of the young Farmer — especially when he has erected a new residence — should be employed in laying out a neat yard and garden, in planting his fruit and shade trees with appropriate care and taste. That being done, the trees and shrubs will be coming on with annual increase of beauty, shade and produce, to enhance the comforts of his rural home and solace the languid hours of age and infirmity. This is a duty which has been sadly neglected, hitherto, in Pennsylvania. It is really distressing to the eye of taste, to witness the number of farm-houses in our ancient Commonwealth, which stand exposed, as it were, in the open fields, without a shrub or a grass-plot to cheer the inmates, or even so much as a friendly tree to protect them from the glare of the summer's sun. No resident of our naked villages, who has enjoyed a promenade beneath the arching elms which adorn the avenues of New Haven, and other eastern towns, can fail to be humbled by the contrast — and to lament the tasteless, cruel negligence, the melancholy want of forecast which has prevailed among our own people. This repulsive feature of barbarism should be no longer tolerated. Every farm should be a beautiful country seat. Such ornamental seats, instead of interfering with the essential duties of Agriculture, tend rather to animate and cheer the labors of every Farmer who has a soul susceptible of true enjoyment. The beautiful shade trees which surround the dwelling, as they grow old, become associated with pleasant reminiscences in the family, and exert a delightful moral influence. The children, who have grown and disported beneath their spreading boughs, become fondly attached to them, and strongly disposed to guard and preserve them. The touching song of our countryman, Morris, owes its popularity no less to a deep seated principle in our nature, than to the engaging simplicity and pathos of its numbers. Every one who has spent the summer days of youth under the lovely shade around the paternal domicil, will be as ready as the poet, to exclaim—

"Woodman! Spare that tree!"

Every descendant of the patriarch who planted it, will interpose to save the venerable tree which sheltered the home of his childhood; and will remonstrate with the *Vandal* who may threaten it, in the earnest and moving accents of the bard:—

"'Twas my forefather's hand
  That placed it near his cot;
There, woodman! let it stand—
  Thy axe shall harm it not.

When but an idle boy,
  I sought its grateful shade:
In all their gushing joy,
  Here, too, my sister play'd.

My mother kissed me here;
  My father press'd my hand,
Forgive this foolish tear—
  But let that old *tree* stand!"

Such reminiscences of our purer days deserve to be fondly cherished, and should never be obliterated by the sterner pursuits of after life. The tasteful arrangement of trees and shrubbery, on a farm, not only conduces to real comfort, but is the surest indication of a gentle, cultivated, and truly civilized people. It demonstrates that boorish rudeness has been surperseded by refined feelings, and a just appreciation of the beauties of Nature. How delightful to the toil-worn Farmer, in the evening of life, to repose in the shade of the trees which he has planted with his own hands! How grateful to the heir of the paternal mansion, to enjoy the umbrageous shelter, provided by the care and taste of his revered progenitor! The shade tree, thus planted, becomes, as it were, a cherished member of an affectionate family. Its longevity renders it an abiding friend of succeeding generations — a silent but most interesting witness of the advent and departure of children, and of children's children — while its aged trunk remains an emblem and a precious memorial of a long line of venerated ancestry."

THE

FARMERS' BOOK.

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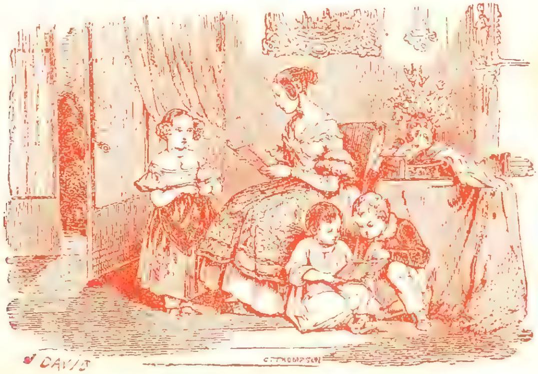

YE LIONS OF THE LAND!—AROUSE!!

The American Farmer.

(Altered from the "Old English Farmer.")

Here's a health to the Farmer who tilleth the land,
Made the best and the wisest on earth, by his hand,
You may roam the wide world, but there's nought to be seen
That can rival the American Farmer, I ween.
Derry down—down,
Down, Derry, down.

What life is so sweet! he's up with the sun—
He hears the day's music so sweetly begun
By robin, and swallow, and lark and cuckoo,
And sees the green lawn besprinkled with dew.
Derry down, &c.

While sluggards in cities, 'mid tumult and strife,
Lose all the best part of this quick fading life,
He breathes the free air at morning's first ray,
And lives twice as long as they do, each day.
Derry down, &c.

He rules every station from castle to cot,
By the high and the lowly he's never forgot,
The poor and the rich man together agree
That without him their lives most wretched would be.
Derry down, &c.

Look around you—what treasures his riches unfold,
His granaries filled with those sheaves of bright gold,
His pens and his pastures all breathing with life,
And his home far away from all passion and strife.
Derry down, &c.

Then a health to the farmer who lives on the land,
Made the best and the wisest on earth, by his hand,
You may roam the wide world, but there's nought to be seen
That can rival the American Farmer, I ween.
Derry down—down.
Down, Derry, down

INTELLIGENCE—SCIENCE—EXPERIMENT—
PROGRESS.

PRODUCTIVE FARMING;

OR A FAMILIAR DIGEST OF THE RECENT DISCOVERIES OF LIEBIG, DAVY, JOHNSTON, AND OTHER CELEBRATED WRITERS ON VEGETABLE CHEMISTRY; SHOWING HOW THE RESULTS OF TILLAGE MIGHT BE GREATLY AUGMENTED.

BY JOSEPH A. SMITH.

This book is a compilation. The object of its compiler has been the simplification of the more strictly scientific and technical writings of the present age. Practical farmers require the simplest and most elementary statements. The position of the agricultural interest renders it desirable that the recent views of Professor Liebig, the distinguished chemist, who has effected a complete revolution in the phisiology of vegetation, should be presented in a style free from difficulty, condensed and separated from such portions of his work as would only bewilder ordinary readers. How far the attempt may be successful, the world must judge. The published lectures of the late Sir Humphrey Davy have been freely cited, and such portions selected, as, while they do not clash with later discovery, may prove a useful addition. The writings of Mr. Johnston, whose little elementary book is well known, have been laid under contribution, as well as the lectures of Dr. Mason Good; and such useful statements as have appeared at various periods in periodicals devoted to the furtherance of agricultural science. It is to be hoped, that without torturing the sense of previous writers, nothing will be found in these pages inconsistent with the doctrines of the learned German professor, whose writings, though admirably adapted for the perusal of those who are familiar with chemistry and phisiology, are susceptible of being abridged and presented to the industrious farmer in a form less repulsive, because less learned, and consequently, more generally intelligible.

NOTE.—Some readers will probably be disposed to raise an objection to the following section of this work, on account of the reference made to *English* soil, &c., &c.,—but there is really no good foundation for any such objection.—The difference between the soil and other circumstances directly referred to by the authors, and those of our own country, is not at all greater than exists in different sections of our widely extended and diversified territory. Every intelligent mind will be able to understand this, and to make all necessary allowances.

MODERN AGRICULTURE.

CHAPTER I.

Introductory Observations.

Agricultural Science has for its objects all those changes in the arrangements of matter connected with the growth and nourishment of plants, the constitution of soils, the manner in which lands are enriched by manure, are rendered fertile by the different processes of cultivation; and no *rational* system of farming can be formed without the practical application of well-understood scientific principles. Such a system must be based on an exact acquaintance with the means of nutrition in vegetables, with the influence of soils, and the action of fertilising materials upon them. The object of the farmer is, to raise from a given extent of land the largest quantity of the most valuable produce at the least cost, with the least permanent injury to the soil; and the sciences of chemistry and geology throw light on every step he takes, or *ought* to take, in order to effect this main object. Whoever reasons on agriculture is obliged continually to recur to these sciences. He feels that, without such knowledge, it is scarcely possible to advance one step; and, if he be satisfied with insufficient views, it is not because he prefers them to accurate knowledge, but generally because they are more current. It has been said, and undoubtedly with great truth, that a philosopher would most probably make a very unprofitable business of farming; and this, certainly, would be the case if he were a *mere* philosopher. But there is good reason to believe, that he would be a more successful agriculturist than a person equally ignorant of farming, but ignorant of chemistry altogether: his science, as far as it went, would be useful to him. The great purpose of chemical investigation in agriculture ought, undoubtedly, to be the discovery of improved methods of cultivation; but to this end, not only practical knowledge but general scientific principles are alike necessary; nor is industry ever so efficacious as when directed by science; as he who, journeying in the night, aided by the most intelligible directions as to the way, is more certain of his footsteps if he carry a lamp to explore his path. Science cannot long be despised by any persons as the mere speculation of theorists, but must soon be considered, by all ranks of men, in its true point of view,—as the refinement of common sense, guided by experience, gradually substituting sound and rational principles for vague popular prejudices. If land be comparatively unproductive, the sure method of determining the cause is, first to ascertain the exact nature and relative quantities of the ingredients which form the soil, (which can only be done by chemical analysis,) and then to supply such soil with the deficient materials requisite for the growth of such vegetables as it is best fitted to raise. The preparation of compost will only be of real use when materials, which do not afford singly an efficient or convenient manure, are made to do so by their mixture. Every farmer has it in his power so to compound the best from his store of manuring materials, that the defects of his soil may not only be remedied, but that the crops may receive those substances in sufficient quantity which are required for their vigorous growth. To do this, however, it is requisite to know not only the component parts of the soil, but also those of the crops. If these are not taken into account, no clear idea either of the composition, much less of the action of manure, will ever be obtained; and many substances of real value will be tried, and, from misapplication, tend to useless, if not injurious results. Perhaps iron may be found in injurious excess, which may be rendered harmless by the addition of lime; or an excess of sand may be neutralized by the addition of clay. Is there a deficiency of lime? The remedy is obvious; or an excess of undecomposed vegetable matter may be removed by the judicious use of lime, by paring and burning. With the aid of chemistry, the precise value of any variety of limestone may be determined in a few minutes; and so its fitness or unfitness, as one among many substances intended to fertilize the soil, may be determined by a less expensive experiment than waiting to observe its action upon the land. In the same way, peat earth of a certain consistence and composition is an excellent manure; but there are some varieties of peat which contain so large a quantity of iron as to be absolutely injurious, if not destructive to corn and grasses. Now, nothing can be more necessary, more useful, and fortunately more simple, than the mode of determining whether a metallic substance be present. More especially, it is solely by a reference to the elementary principles of chemistry, and the ascertained constitution of manures, vegetables, and the air and soil in which they live and thrive, that we can determine whether it is wiser to plough that manure into the land, to apply it in a fresh, or in a fermented and decomposing state. We know, that soon as dung begins to decompose, it throws off its volatile or gaseous parts. It is necessary that what is thus lost should be examined. It may be (which is the fact) that such evaporation is not only the escape, but the *actual loss* of that which forms a most material ingredient in the food of plants: and so, whether this shall be supplied gradually to the growing vegetable, or suddenly, is a tantamount question in the mind of an intelligent agriculturist to the inquiry often agitated among practical farmers, and determined only by individual caprice or fancy, as to whether the produce of the stable or the farm-yard is best, when spread upon the soil in a fresh or in a putrid state. When, for instance, it is considered, that with every pound of the strongly-pungent smelling ammonia lost in the air, a loss of at least sixty pounds of corn must correspondingly be sustained,—and that with every pound of urine a pound of wheat might be produced,—not only must we feel surprise at the ignorance which prevails as to the fact, but equally so at the indifference manifested by those who are aware of the value of such manure as to the best mode of applying it. On some soils a plant will thrive, on others it will sicken ; and the same knowledge which will enable us to correct a faulty or weak vegetation, will enable us also to produce far more abundant results than occur under the most favorable ordinary and natural circumstances. Agriculture has hitherto never fairly sought aid from that science which is based on the knowledge of those substances which plants extract from the soil, and of those restored to the soil on which they grow by means of manure. The application of such principles will be the task of a future generation ; for what can be expected from the present, which recoils with seeming distrust and aversion from all the means of assistance offered by chemical investigation ? A future generation will derive incalculable advantage from these means of help, and make a rational use of philosophical discoveries. Here a marked and wide difference exists between the progress of manufacture and the history of agricultural operations. We see the steam-engine multiply indefinitely the labor of the human hand—supersede and almost infinitely exceed the united power of brute exertion ; invention has lacked no mechanism to produce myriads upon myriads of the same fabric ; thousands of piles of manufactured silks and cottons are produced annually, one factory supplying daily as many yards as would encircle the globe—strange advancement on the ancient spinning-wheel ; while the sons of the soil still toil on through the long summer months, and brave the winter's cold to reap the same quantity of produce from the soil as their forefathers of a thousand years ago. We do not say that there is no limit to the capabilities of the earth's surface, but fearlessly maintain that such limit is yet far from realization ; and that not until prejudice be silent, and intelligence more universal, can it be hoped that the broad acres of our island home will yield to science and skill all the treasures they contain.

At a recent meeting of one of the Irish agricultural associations, a Scottish agriculturist is reported to have said, among other things, that "If science were permitted to do for farming all of which science is capable, the clamor about repeal of the Corn Laws would soon cease, and the prospect of starvation before us would vanish." He observed, that "Great Britain, besides supplying her own population with food in abundance, would become an exporting country for ages to come : that unless a more rational system of farming be adopted throughout the country, we shall have want, and its offspring, crime, at our doors and on every side of us. The manufacturers are offering premiums on the increase of population. That population is increasing far beyond the supply of food necessary for it, [he might have added, at the rate of a thousand a day, while the surface of our island remains the same;] and unless the government, or the great agricultural societies, take the matter in hand, and that speedily, we shall soon feel that, solely from *lack of food for her* MANUFACTURING population, the greatness of this empire, so long the wonder and envy of the world, will become a thing to be talked of as a tale that has passed away."

Half a century sufficed to Europeans, not only to equal, but to surpass the Chinese in the arts and manufactures; and this was owing merely to the application of correct principles deduced from the study of chemistry. But how infinitely inferior is the agriculture of Europe, even of boasted England, to that of China! The Chinese are the most admirable gardeners and trainers of plants, for each of which they understand how to prepare and apply the best adapted manure. Their agriculture is the most perfect in the world: and there, where the climate in the most fertile districts differs little from the European, very little value is attached to the excrements of animals. Patient observation of results, and a ready adoption of really useful plans; steady persistance, not in antiquated methods and notions, but in all that has been found by experience to be beneficial,—has raised the agriculture of that country, long ago, to a position which would rapidly, nay, instantly, be ours, if science were permitted to achieve for us that which, with them, has been the slow growth of centuries of experiment.

The soil of England offers inexhaustible resources, which, when properly appreciated and employed, must increase our wealth, our population, and our physical strength. The same energy of character, the same extent of resources which have always distinguished Englishmen, and made them excel in arms, commerce and learning, only require to be strongly directed to agriculture, to ensure the happiest effects. We possess advantages in the use of machinery and the division of labor, peculiar to ourselves; and these having been mainly instrumental in aiding one great division of human industry, we are justified in the assertion, that the steam-engine and machinery has not done more for trade, than science and skill, in various ways, may do for land. Although it is obvious to all reflecting persons, that machinery, which is science in another form, is a good thing, we cannot wonder if we find some ready to say, "I know it is a bad thing, for it deprived me of employment." To attempt to convince such a man would be difficult. It would be useless to argue with that man, that a number of individuals had gained, though he was a loser. His loss is to him evident; and the gain spread over a vast surface of society is an argument which makes no impression upon him.

Besides chemistry, there is another science which has many relations to practical farming—the science of geology, or that which embodies all ascertained facts in regard to the nature and internal structure, both physical and chemical, of the solid surface of our globe. Though the substances of which soils *chiefly* consist are so few in number, yet every practical man knows how very diversified they are in character, how very different in value. Thus, in some of the southern English counties we have a white soil, consisting, apparently, of little more than chalk; in the central part of the country, a wide plain of dark-red land; in the border counties of Wales, and on many of our coal fields, tracts of country almost perfectly black; while yellow, white and brown lands give the prevailing character to the soils of other districts. These differences arise from the varying proportions in which the sand, lime, clay, and iron which color the soils have been mixed together. Now, geology explains the cause why they have been so mixed in different parts of the country—by what natural agency, and for what end; and by its aid we can predict the general quality of the surface-soil, and, more than this, of the unseen *sub-soil* in the several parts of entire kingdoms. We may learn, if the soil be of inferior quality, and yet susceptible of improvement, whether the means of improving it are likely, in any given locality, to be attainable at a reasonable cost.

Whether we attempt to investigate the composition of natural bodies, or, confining our attention to the review of those general diversities so remarkable on the earth's surface, the division of them all into two grand classes, as simple or compound, is an essential preliminary to a correct comprehension of the subject. Those substances are *simple*, which cannot, by any known method, be separated, decomposed, or divided, in such a manner as to produce particles different in their properties from one another. On the other hand, those substances are *compound* which, by experiment, may be resolved into particles of an unlike nature. Thus, marble is a compound body; for by a strong heat it is converted into lime—an elastic fluid, which is carbonic acid gas, (itself also a compound,) being disengaged during the process. Vegetable substances, whether in their living or dead state, are mostly of a very compound nature, and consist of a great number of elements. For a period of many centuries, and even till a very late date, there were four substances held to be elementary, or simple. These were Fire, Air, Earth, and Water. Nobody could prove them so; and yet, of these four bodies, all others in nature were supposed to be constituted. This system continued to be orthodox till very lately, when *three* of these imaginary elements, namely, Air, Water, and Earth, were proved to be compounds; and, as we shall see in the progress of this work, a correct understanding of the properties of the atmosphere, and of its relative agency over vegetation, is indispensable to the adoption of such plans as are intended to increase the fertility of the soil. As to fire, it is still unknown whether it be simple or compound, in what its essence consists, or by what causes its effects are produced. The study of temperature, of the relative dryness or moisture of the air, of the action of the sun's heat over soils and vegetation, is closely identified with the science of agriculture. The influence of the changes of seasons and of the position of the sun on the phenomena of vegetation, demonstrates the effects of heat on the functions of plants. The matter absorbed from the soil can only enter the roots in a fluid state; and when the surface is frozen, this mode of communication is suspended. The activity of chemical changes in living vegetables is likewise increased by a certain increase of temperature, as is evident if a stalk of henbane be partially immersed in hot water: its leaves will, for a time, become erect, and quickly forego their drooping arrangement, evidently referable to the increased rapidity with which fluids, under such circumstances, rise in the minute vessels of the vegetable. Heat, then, is rather to be regarded as an agency by which both compound and simple substances are alike affected. What the ancients considered to be *simple* bodies, are no longer considered to be such: but, in place of these four assumed substances, the chemists of modern times have elevated to the dignity of elements, or *simple* bodies, a far more numerous race. No one, however, asserts now-a-days, that even these are all absolutely simple. The term " element," intimates no more than that the body to which it is applied, has never, in the opinion of modern chemists, been subject to further division or decomposition: that it has never been divided into particles, different from one another, or from the original substance. The number of simple, or elementary substances, at present known, and constituting visible Nature around us, is *fifty-four*.

Now, if these elementary, or simple substances are placed either artificially, or, as they are presented in the universe, naturally in contact with each other, they combine, or refuse to combine; and by such combination, when it occurs, a great variety of *compound* substances are produced. Some combinations are effected instantly, some more slowly and with difficulty, and there are certain elements which can scarcely, by any means, be made to combine. The compounds produced by such combinations possess properties very different from those of the separate elements of which they are composed. Thus, carbonic acid, or the gas which sparkles in fermented liquors, combines very readily with pure caustic lime, and the product of the union is common chalk. So, if the proportions be varied, the same two elements produce the common air we breathe and the strongest aquafortis or nitric acid. The *power*, in virtue of which simple bodies can combine and produce compounds, is one of which the nature is totally unknown. Chemists have learned no more than that simple bodies, or bodies supposed to be simple, *do combine;* but WHY they combine, or what that is which makes them combine, they have not discovered. To the illustrious Dalton belongs the discovery that they do not unite at random, but always in definite proportions of each; so that, if the elements be represented by numbers, the proportions in which they unite may be expressed either by those numbers, or by some simple multiples of them. Thus, sugar and India rubber are compounds resolvable into precisely the same *ultimate* elements, only in different proportions; and, as the following table will illustrate, nearly one-half the weight of all vegetable productions which are gathered for food for man or beast, in their dry state, are but varying compounds of the same elementary or simple bodies, the names of which are appended over the annexed numbers. What the properties of these elements in their separate state may be, is not our immediate purpose.

	Carbon.	Hydrogen.	Oxygen.	Nitrogen.	Ash.
Hay,	458	50	387	15	90
Potatoes,	441	58	439	12	50
Wheat straw,	485	52	389	4	70
Oats,	507	64	367	22	40

parts by weight in 1000 pounds of each of the above vegetable substances.

If we take the ash left by a known weight of wheat straw, or of hay, and mix it with the proper quantities of the four elementary substances named in the foregoing table, we shall certainly be unable, by this process, to form either the one or the other. The elements, therefore, into which all vegetable compounds are ultimately resolvable, are not merely *mixed* together; they are united in some closer and more intimate manner. To this more intimate state of union the term *chemical combination* is correctly applied. Again, woody fibre, gum, sap, and the various fluids and substances which form a plant, are themselves mostly resolvable into varying proportions of the same ultimate elements, which, taken together, form the entire vegetable. Thus, sugar forms one of the *proximate* principles of the sugar cane, and India rubber is one of the *proximate* principles of a South American tree, which contains no sugar; yet sugar and India rubber are *essentially* composed of the same materials. So, if charcoal be burned in the open air, it slowly disappears, and forms a kind of air or gas, known by the name of carbonic acid, an elastic fluid precisely identical with that which forms the froth in ginger beer or common yeast. Now, this carbonic acid is formed by the union of the charcoal or carbon, while burning, with one of the elemetns composing common air, named oxygen; and in this new form, the elements carbon and oxygen are said to be *chemically combined.* Again, if certain vegetable and animal materials are mixed together, and left to the agency of the atmosphere, they re-act upon each other—perhaps become heated, as happens in a heap of stable dung, and are said to become *decomposed.* New compounds are formed from the union of previously existing elements; perhaps AMMONIA is one of the most common and obvious, as indicated by its effect upon our eyes and nostrils. This, then, is as purely a chemical process as the conversion of wood into vinegar, or into charcoal, or the change that occurs when the flour of grain is converted by the distiller into ardent spirits; and in all well-directed attempts to fertilize the soil, a knowledge of these changes is absolutely necessary: at least, he who proceeds without it has disapppointment in prospect, and gropes in the dark, with uncertainty for his guide.

Now, *chemical affinity* is not only evident in the changes which masses of dead inorganic matter produce upon each other: it is found to be actively at work in the phenomena of vegetation; thus proving that the growth of plants is more completely a chemical process than might have been imagined: and, as our farther illustrations will tend to prove, the same law of affinity is equally operative upon *animal* structure, which, like that of plants, is not more truly *alive* than they. The sap consists of a number of ingredients dissolved in water by chemical attraction; and it appears to be in consequence of the operation of this power, that certain principles derived from the sap are united to the vegetable organs. By the laws of chemical attraction, different products of vegetation are changed and formed during the process of growth: vegetable and animal remains are decomposed by the action of air and water, or exert upon those fluids a mutual agency essential to the change; rocks are broken down and converted into soils, and soils are more finely divided and fitted as receptacles for the roots of plants. The repulsive energy of solar heat, or of that generated during chemical changes of constant occurrence, serves as the only counterbalance to that *attraction* which pervades the particles of all living or dead matter: and thus the harmonious circle of growth and decay is produced by their mutual operations. The different influence of the different solar rays on vegetation is but partially understood. There are rays transmitted from the sun which do not impart light, and which yet produce more heat than the visible rays. The effect of these invisible rays is purely *chemical* and independent of the heat they produce. Thus, potatoes, which sprout in a comparatively dark cellar, send out nearly colorless shoots. Plants kept in the dark in a hot-house, grow luxuriantly, but never acquire their natural colors; their leaves are white or pale, and their juices watery and sweet. So the upper surface of most leaves is darker than the lower, upon the same principle that the belly of a fish is whiter than its back.

The most obvious instance of *Electrical Agency* in external nature occurs in thunder and lightning. Electrical changes are of constant occurrence; but as yet the effects of this power, not as accidental, but as essential to healthy vegetation, have not been correctly estimated. No doubt the germination of seeds, as well as the growth of plants, is materially modified by the peculiar electrical condition of the earth and the atmosphere, and by the varying state of each. It is known that corn will sprout more rapidly and readily in water positively electrified—that is, charged with electricity in excess or beyond its natural quantity; and that if, by artificial means, water be deprived of its natural amount of electricity, its power of stimulating the growth of seeds is thereby diminished. Experiments made upon the atmosphere show that clouds are usually deficient of electricity; and as when a cloud is in one state of electricity, the surface of the earth beneath that cloud is brought into the opposite state, it is probable that, in common cases, the surface of the earth is charged with the electric fluid in excess.

We have spoken of Chemical *affinity:* it is sometimes well named *Elective* or Chemical attraction, in as much as it is but an exemplification of one form of that law which maintains the order of the universe. It is the expression of the fact, that certain elements of unlike nature combine with each other when placed in contact, or (figuratively speaking) refuse to combine with any other, electing even the proportions in which only such combinations can occur. This affinity is but one division of the great law of *attraction.* In this aspect, there are *five* forms in which the relations of all bodies to each other may be arranged. We begin with that which compels the heavenly bodies to rotate round the sun; or a stone when thrown upwards to fall to the ground—in other words, to *gravitate* towards the earth's centre. Next, there is the *attraction* of cohesion: thus, particles of oil will rise through water, and having reached the range of each other's attraction, will unite into one common and separate body. It is this form of attraction which gives roundness to the drops of dew, or of the rain as it falls, and is the sole cause of the arched form of the rainbow. In the same way, drops of water or of quicksilver placed upon a dry plate, have a tendency to unite, not only when they touch, but to run together when placed near each other. So, perfectly smooth and polished plates of glass or metal have a strong tendency to cohere. It is by the same means that the great number of rocks seem to be produced that enter into the substance of the earth's solid crust. The lowermost rocks are united by an intimate crystalization which is the most perfect form of cohesive or aggregate attraction that can exist among the particles of solid bodies. The next form of *attraction* is observed as occurring between bodies *unlike* in their nature, solids and fluids, *capillary* attraction, as when sap rises in the minute vessels forming the stem of a tree against its own weight, or in other language, overcoming the attraction of gravitation downwards. The Latin word which signifies a hair, is used in this instance to form the word denoting the extreme tenuity and delicacy of these narrow vessels, as only in such fluids rise: hence the reason and the wisdom of this arrangement.

Electrical and Magnetic attraction are important subjects for study, to which in a practical work it is not necessary very minutely to allude. It is well ascertained that the thorns, spines, or prickles that exist on a variety of plants serve not merely for their defence; they have a relation to the electrical condition of the atmosphere; cases having been recorded in which spines have grown more than an inch during a thunder-storm. Some of the acacia tribe are fretted over with formidable spines which will take off a charge of electricity from a prime conductor as rapidly as a brass point—doubtlessly from the presence of a metal in those spines, probably the metallic base of flint. Now it is very unlikely that only the prickly plants require the electric stimulus. We know that, though the torpedo and electrical eel have power to benumb and kill, yet human beings, who have no such powers in health and disease, are always charged with varying quantities of the electric fluid. So also of all vegetables: oat and wheat straw contain silica, which is metallic; and the firmness of the stem may not be, and is not, the only reason for its presence. Lastly, we have *Chemical attraction* or *affinity.* A few instances of its operation have been already noted; but some affinities are more powerful than others. Pure lime has a strong affinity for carbonic acid gas, and this is a wise ordination; and it is equally a proof of design that it should form one of the ingredients of the atmosphere. Under this arrangement of things, whole mountains of lime have been crumbled during successive ages into fertile beds of chalk. But lime has a still greater affinity for sulphuric acid or oil of vitriol than it has for carbonic acid; and so, if natural or artificial chalk be subjected to the action of vitriol, another decomposition ensues: the carbonic acid flies off, leaving the lime to combine with the acid for which it has a more powerful affinity, the result of the new union being sulphate of lime, better known as *alabaster* or *common gypsum.* These transformations may not only be produced artificially, but are of constant occurrence, though of slow operation, in the great laboratory of Nature. To understand them is essential to the slightest knowledge of those chemical changes which are identical with the processes of growth in the vegetable world, and indeed in all living organized bodies,—and there are sufficient motives connected both with pleasure and profit to encourage ingenious men to pursue this new path of investigation.

CHAPTER II.

Some Account of the Simple or Elementary Bodies found (combined or uncombined) in Animals, Plants and Soils.

It is absolutely necessary, in order to a right apprehension of the changes that occur during vegetable growth, and, of course, to a correct estimation of the most rational methods of forcing or favoring healthy vegetation, that we should become familiar with some of the most common properties of those simple bodies or elements, of which all nature around us is compounded.

Four of them, by combining with other simple bodies that will burn, form acids; eight of them are inflammable; and there are upwards of forty metals.

First, let us speak of *Oxygen.* Oxygen, in union with latent heat, forms Oxygen gas, constituting about one-fifth of the air of our atmosphere. It is an elastic fluid at all known temperatures. It is heavier than the air, and supports combustion with much more vividness than common air; so that if a small steel wire, or a watch spring, having a bit of burning wood attached to it,—or, better still, a bit of phosphorus or brimstone, be introduced into a bottle filled with this gas, it burns with surprising splendor. Oxygen is a substance very extensively diffused throughout the material world: it forms with nitrogen the air we breathe; united with another element, named hydrogen, it forms water. It exists as a constituent of all animal and vegetable matter; and is found also naturally in combination with most mineral productions; from some of which, for experimental purposes, it may with great ease be prepared. Oxygen gas, when suddenly compressed, evolves both light and heat; is sparingly dissolved by water, 100 cubic inches taking up only three or four of the gas. If a mouse, or a bird, were confined under a large bell-glass, filled with common air, it would live until it had consumed all the oxygen contained in that portion of air and no longer. If, instead of the bird, a bit of burning brimstone, or a candle were placed there, it would burn until it had absorbed all the oxygen, and then become extinguished.

2. *Hydrogen.*—Hydrogen, or inflammable air, is the lightest known substance, being about sixteen times lighter than common air. For this reason, it is used in filling balloons. The common gas in the streets and shops is mostly used for this purpose, instead of pure hydrogen; the carbon it contains not materially destroying its lightness. Not only is pure hydrogen the lightest of gases, but it is highly inflammable; it will neither support combustion or respiration; in other words, if a lighted taper or a living animal be immersed in pure hydrogen gas, it would cease to burn, or die. Hydrogen and oxygen are the two elements which form pure water, of which we must say more in another place. When these gases are mixed in certain proportions, they unite and explode with great violence if a lighted candle be brought in contact with them; for experiment's sake, one part of hydrogen, and six of oxygen or even atmospheric air, will form a very powerful explosive mixture. When a stream of hydrogen gas issuing from one vessel, and a jet of oxygen from another, are made to inflame as they unite, a most intense heat will be generated, sufficient to melt the clay of a common tobacco pipe, and render lime perfectly fluid. Neither hydrogen nor oxygen are known to occur any where in nature in any sensible *separate* quantity. They are abundant enough in combination with other matters.

3. *Nitrogen*, sometimes called Azote, is another elementary substance, entering most largely into the constitution of universal nature. United with the matter of heat, it may be artificially produced and presented as a transparent colorless, insipid, incombustible gas, incapable of supporting flame or breathing. It may be made to unite with oxygen (but of course only in certain definite proportions) by the agency of electrical fire. It may easily be procured by burning a bit of phosphorus in a confined portion of air over water. The inflamed phosphorus rapidly unites with the oxygen until it has exhausted all that the air contains, then combustion stops, and the remaining gas is nearly pure nitrogen. Small creatures soon die in it for want of oxygen. It *combines* in five different proportions with oxygen, forming, in one instance, nitric acid or aquafortis; and *mixed*, rather than chemically combined, with one-fifth its bulk of oxygen, it forms the air we breathe. Though ammonia is not a simple body, and, therefore, not to be classed with the present list, it may not be inap-

propriate, after the mention of hydrogen and nitrogen, to say that it results from the union of the two. Ammonia exists in rain water, and, as we shall subsequently show, is an auxiliary to vegetable growth; it becomes developed in putrid urine or stable compost; it is a colorless gas, with a strong pungent odor. It dissolves easily in water, and is then called hartshorn. It is very volatile; has all the common properties of soda and potash, combining readily with acids. Sulphate of ammonia exists largely in the soot from coals. From this source the "sal ammoniac" of commerce is procured.

Carbon.—Charcoal is the most usual, and best known variety of carbon. It is black, soils the fingers, and is more or less porous, according to the kind of wood from which it has been formed. Coke, obtained by charring, or distilling coal, is another variety. It is generally heavier or denser than the former, though less pure. Black-lead, or carburet of iron, there being in reality no leads in its composition, is a third variety, still heavier and more impure. The diamond is the only form in which carbon occurs in nature in a state of perfect purity. That the diamond is essentially the same substance with pure lamp-black is a very remarkable circumstance. Charcoal, the diamond, lamp-black, and all the other forms of carbon, burn away more or less slowly when heated in the air; and, combining with the oxygen of the atmosphere, form carbonic acid.

Oxygen, hydrogen, nitrogen, and carbon, form the ultimate elements into which all the *organized* part of all vegetable and animal substances is resolvable. We say *organized:* bones contain lime, and vegetables contain earthy and saline matters; but these are *not* organized, they are deposited in cells, or in a structure so arranged as to contain them.

Chlorine, or Oxymuriatic gas, is, like oxygen gas, a permanently elastic fluid. When pure, it has a greenish yellow color, and a very disagreeable odor and acid taste. It may not be breathed, and burning bodies are extinguished by it. It destroys all vegetable and animal coloring substances, as also the effluvium arising from the putrefaction of dead animal matter. It does not exist separately in nature, but is one of the components of common salt.

Fluorine.—This substance has such strong tendencies to combination, that as yet no vessels have been found capable of containing it in its pure form. It is one of the elements composing the Derbyshire fluor spar or blue john. This mineral is a fluate of lime, in other words, a compound of fluoric acid and lime. Now, fluoric acid is itself a compound of fluorine and hydrogen; and lime is not a simple body, but in reality the oxide or rust of a metal named Calcium, from the latin word "Calx," signifying lime. Fluoric acid may be obtained from the Derbyshire spar by the action of sulphuric acid, which combines with the lime in consequence of the greater affinity of the two than exists between lime and fluoric acid, which by such process may be separated.

Having disposed of these, we proceed to notice (not the whole range) but a few other simple substances found in nature, and chiefly in the animal, vegetable, and mineral world.

Sulphur.—This is a solid substance, of a light yellow color, brittle and tasteless, and when rubbed emitting a peculiar odor. Melted and poured into cylindrical moulds it forms the rolled brimstone of commerce. It burns with a pale blue flame in the open air, during which process it combines with the oxygen of the atmosphere, and forms sulphuric acid or oil of vitriol. Sulphur is found native in Sicily, Italy, and Iceland, and in combination with metals and earths in greater or less quantity throughout the mineral kingdom. It is a constituent of many vegetable and nearly all animal structure.

Phosphorus.—Phosphorus is most easily obtained by burning bones to whiteness in an open fire. In this way the animal matter is driven off and nearly pure *phosphate of lime* (or a salt composed of phosphoric acid and lime) remains. This phosphate of lime, reduced to powder, is next mixed with oil of vitriol and water; decomposition ensues in consequence of the greater affinity which oil of vitriol or sulphuric acid has for lime than the phosphoric acid already in combination with it. Next, by evaporation, the addition of powdered charcoal, and exposure of the mixed mass to distillation, the liberated phosphorus is separated into its two elements, (phosphorus and oxygen,) the former of which distils over, and at a low temperature becomes solid. Phosphorus may also be prepared from urine. It takes fire at a heat considerably lower than that of boiling water. Phosphorus has a waxy consistence; when burned in oxygen gas, a very dazzling light is produced; and the result of the combination is phosphoric acid, just as sulphur or brimstone, burnt in oxygen gas, produces sulphuric acid. Phosphoric acid combined with lime, forms phosphate of lime, the solid inorganic constituent of bones. Phosphate of lime is easily obtained by exposing bones to a red heat in an open fire. Its first action is to blacken the bones, converting its animal carbonaceous matter into charcoal: if the heat be continued, the charcoal or carbon unites with the oxygen of the atmosphere in the form of carbonic acid gas, and the phosphate of lime remains beautifully white, left in the shape and arrangement of the organized cells it lately filled. Phosphate of lime is found as a native mineral production in some parts of Ireland and elsewhere. Phosphorus will dissolve in spirit of wine or in oil, but is insoluble in water, under which fluid it is always preserved.

Iodine.—This simple substance is found existing as an undecompounded element in the ashes of marine plants after the extraction of the soda they contain. Sea-weed is largely used on the coasts of England and Scotland as a manure. Iodine is a dark-colored solid, having somewhat the appearance of black-lead. It unites to all the metals upon which its action has been examined, and combines with oxygen, forming an acid.

Next, let us allude to earths and metals, or such forms of them as fall within the range of simple elementary bodies. We have already said that lime, ordinarily considered as an earth, is in reality a metallic oxide; pure soda, pure potash, calcined magnesia, pipe-clay, the base of flint, and some other similar substances, are, in truth, *metals*, united to oxygen in the same way as rust of iron is a compound of iron and oxygen. Lime then, or, in chemical language, "oxide of calcium," combined with various acids, is a very abundant natural production, found widely diffused over every part of the habitable globe, as limestone, marble, chalk, fluor spar, plaster of Paris, gypsum, or alabaster; these, under various names, being all of them compounds of lime with the carbonic, fluoric, or sulphuric acids. Besides these, lime, in combination with phosphoric acid, enters very largely into the composition of the solid skeleton or shell of animals. Pure lime is more soluble in cold than in hot water, a fact not without its interest nor intention. If chalk be exposed to a red heat, the carbonic acid, one of its constituents, is expelled, and pure lime remains. Pure, or caustic quicklime corrodes animal and vegetable substances, and is never found in them in an unmixed state. Lime is one of the most infusible bodies known, but may be made to melt by the joint action of the combustion of oxygen and hydrogen gases. Lime has a powerful affinity for water, and the combination is attended with the extrication of great heat, as when lime is slaked for the builder. In this process the water becomes solid, *unites*, not mixes, with the lime, and in passing from the fluid to the solid state, gives out the *latent* heat necessary to maintain fluidity. This heat becoming suddenly sensible, is sufficient to carry off a portion of the water in vapor, the union of the lime and water producing a dry solid. The same chemical union occurs when plaster of Paris, or dry sulphate of lime, is mixed in certain proportions with water: the fluid solidifies, and unites with the lime into the hard substance which forms the common plaster images or casts hawked about the streets by the Italians. Lime combines freely with many acids, existing in this form as "muriate of lime" in the water of the ocean. Of the application of earth minerals to the land, we will speak in its proper place.

Sodium.—This is the first metallic base of common table or rock salt, which is a compound of two elements, chlorine, already alluded to, and sodium, with water. The metal sodium has a lustre and color very similar to silver, and is so soft as to be pressed into leaves between the fingers. It may be obtained through the agency of the galvanic apparatus. When thrown upon water it decomposes that fluid, it soon becomes oxidized, or robs the water of oxygen, setting its other constituent, hydrogen, at liberty, the action being accompanied with a hissing noise. Chloride of sodium, or common salt, is abundantly diffused over the world, both as a solid mineral production, and as the principal ingredient in sea-water; it is essential to healthy action, as well in vegetable as in animal nutrition. If thrown upon hot coals, salt crackles, because the water it contains is not chemically combined, but merely mixed or interposed between its particles, and so expanding by heat causes the separation of those particles and the resulting sound. Sodium united to oxygen, forms pure soda; pure soda united to sulphuric acid, forms the Glauber salt, so commonly given to cattle; pure soda united to carbonic acid, forms the substance sold in the shops as "soda," and bought for the purposes of the washerwoman.

Potassium.—This is the metallic base of common pearl ashes. If the pure metal be thrown upon water, like sodium it swims on the surface, and darts violently hither and thither, with the sudden extrication of flame. This flame is burning hydrogen, and the phenomenon arises from the great affinity of potassium for oxygen, abstracting it from water, or all bodies that contain it. If the metal potassium be united with oxygen, it forms pure, or caustic potash, or oxide of potassium ; if pure potash be united with carbonic acid, the result is carbonate of potash, of which *pearl ashes* is an impure variety. United with nitric acid, potash forms saltpetre, which is found very abundantly as a natural product. Potash, combined with oxalic acid, is found in sorrel, and other plants. Impure carbonate of potash remains in the ashes of most vegetables, and so largely in some of them, as to yield the immense supply for trade. Potash, united with fatty or oily substances, forms the various kinds of soap.

Silicon is another metal which, in union with oxygen, forms *silica*, or siliceous earth, existing native in great abundance, and forming the chief ingredient in *flint*, quartz, and rock-crystal. From these substances silica may easily be obtained, by first heating them to redness, and then throwing them into water. For all common purposes, sand from the glass-house will answer. It unites with potash, and forms glass, and is insoluble in all acids, except the fluoric acid, for which reason this acid is kept in leaden bottles. Silica exists very largely in the hard coating of the sugar cane. In the stem of wheat straw, silica is essential to the firm, erect position of the plant ; consequently, if the soil be deficient of silica, (a fact which is easily determined,) the ear of corn will droop, upon a slender, short, and lanky straw.

Alluminium.—This metal, in combination with oxygen, forms pure alumina. Alumina, more or less pure, exists as a most abundant natural production, being found as a chief constituent of *clay*, for pottery and bricks. Crystalized, it forms those precious gems, the ruby and sapphire: so that the difference between a bit of charcoal and a diamond, is a similar difference to that which exists between a bit of clay and a precious jewel—merely a diversity in the arrangement of particles of the same matter.

Barium.—A metal forming the base of the earth baryta, and of the various acids in combination with that earth. Carbonate of baryta is found native in Derbyshire. Pure baryta, like lime, slakes when in contact with water; for which it has so strong an affinity, that the heat of a forge will not drive it off.

Magnesium.—The metallic base of the earth magnesia, the calcined magnesia of the shops. In combination with muriatic acid, it exists largely in sea-water. With sulphuric acid, magnesia forms the common Epsom salt, and is found as a native magnesian limestone, in combination with lime and carbonic acid.

Iron.—Iron is found native in many parts of the world, and is also very abundant in combination with sulphur, and many other substances, such as oxygen, forming oxide; also in further union with acids, forming carbonates, sulphates, and phosphates. Green copperas is a sulphate of iron. Rust of iron, produced by the action of the atmosphere, arises from the combination of the iron with oxygen, derived from the air, and also with a portion of carbonic acid from the same source, and so may be correctly named carbonate of iron.

Lead.—Metallic lead is rarely found native, but is obtained in large quantities by smelting the sulphuret, a mineral known by the name of galena. Lead is found also in combination with oxygen and acids.

Copper.—This metal occurs very commonly native in a state of perfect purity, sometimes in large masses, at other times in a crystalline form. It is commonly found in combination with sulphur, from which it is generally obtained. Blue stone, used by the farrier, is a sulphate of copper.

Zinc.—Metallic zinc, sometimes named spelter, is obtained either from the impure carbonate, a native production called "calamine," or from another natural compound, the "sulphuret," or zinc blende. White vitriol used in veterinary medicine, is a sulphate of zinc. The ores from which it is smelted, exist largely in some districts.—Tin, bismuth, antimony, arsenic, nickel, cobalt, and many other metallic substances, might similarly be enumerated; but these, existing in comparatively minute quantities, may be safely passed over. The elements found in vegetables are but few. Oxygen, hydrogen, and carbon, form the greatest part of their organized matter. Nitrogen, phosphorus, sulphur, manganesum, iron, silicum, calcium, aluminium, and magnesium, enter into their composition, or are found in the agents to which they are exposed; and these *twelve*, out of nearly sixty *undecompounded elements*, require to be familiarly understood by the agricultural chemist. Life gives a peculiar character to all its productions: the power of attraction and repulsion, combination and decomposition, are subservient to it. A few elements, by the diversity of their arrangement, are made to form the most different substances; and similar substances are produced from compounds which, when superficially examined, appear entirely different.

CHAPTER III.

Plants and **Animals** are both alike endowed with **Life**; the *Elementary Materials* and many of the *Proximate Principles* of *Animal* and *Vegetable matter are precisely identical*—they have *similar* **Organs** essential to their *growth* and *reproduction,* and are *nourished* or *destroyed* by the same agencies.

If I dig up a stone and remove it from one place to another, the stone will suffer no alteration by the change of place; but if I dig up a plant, and remove it, strip its leaves, and leave the stem standing, or mutilate an animal,—that plant or animal will instantly sicken, and perhaps die. What is the reason of this? Both have been perfected in connexion with the same common soil. If I break the stone to pieces, though chemically, it may consist of several elements, yet every individual fragment will be found possessed of the original character of the whole mass; it is only altered in shape and magnitude; but if I tear off a branch from a plant, it will wither and lose the properties of its parent stock. The mineral can only be destroyed or changed by mechanical or chemical force; while the plant, like all animals, has been produced by generation, has grown by nutrition, and been destroyed by death,—in fact, it has been actuated by an internal power.

In what this internal power consists, we know not. Differently modified, we meet with it in both plants and animals. Wherever we find it, we denominate it the "PRINCIPLE OF LIFE;" its presence forming a clear distinction and boundary between the two great families of animals and plants, and all else besides in the universe. A cabbage is not less truly alive than the ox which feeds upon it. The superiority of the animal over the plant consists chiefly in this—the existence of mind or intellect; and correspondingly, a brain and nerves, of which the plant is deficient. Now all living things are said to be *organized;* that is, made of *various structures*, evidently destined to answer certain ends; and these, taken together, compose the entire plant or animal: as the root, sap vessels, bark, leaves, and other organs of a tree; and correspondingly, the bones, muscles, blood-vessels, skin, and lungs of a horse, a man, or of a sheep. But this description is not true of a piece of limestone, or a lump of clay, and, therefore, it is said to be *inorganized.* Hence, all the various bodies in nature arrange themselves naturally under the two great divisions of organized and vital, or inorganized and dead, without a single exception.

In their more perfect forms, the distinctions between animal and vegetable life are obvious enough. There is a wide distinction between a horse chesnut and a chesnut horse; but as we approach the contiguous extremities of the animal and vegetable kingdoms, the distinction is not so easy. There are some natural productions which have been originally considered as minerals, afterwards as vegetables, and have at last been regarded as belonging to the animal kingdom; less on account of any other property they possess than their similarity of chemical and elementary constitution to the well-known ingredients of animal matter. Sponges, and many fungous growths, are of this character.

In what part of a plant the living principle chiefly exists, or to what quarter it retires during the winter, we know not; but *we are just as ignorant in relation to animal life.* In both, it operates towards every point; it consists in the whole, and resides in the whole; and its proof of existence is drawn from its resisting those putrefactive or chemical agencies which instantly begin to operate as soon as the plant or animal is dead. While life exists, a vegetable or animal thrives and increases in its bulk; a tree puts forth annually a new progeny of buds, and becomes clothed with a beautiful foilage of lungs, (every leaf being in itself a distinct lung,) for the respiration of the rising brood, and with an harmonious circle of action that can never be too much admired, a perpetual supply of nourishment is furnished first for its own growth, next for the growth and perfection of animal life; while, from its own decay, as well as from the death of animal matter, there is formed, in rich abundance, the means of new births, new buds, and new harvests. In fact, every thing is formed for every thing, and subsists (if we may speak figuratively) by the kind intercourse of giving and receiving benefits. Such is the simple, but beautiful, circle of nature. That which lives, flourishes, decays, and dies, is not lost; the great principle of life only changes its form; and the destruction of one generation of plants or animals is but the necessary requisite to the support or existence of the next.

Carbonic Acid, Ammonia, and Water, yield elements out of which are built up all the *organized* parts of plants; and it is no less true that these elements form the entire *organized* structure of animals. This being the fact, we should naturally suppose the conditions essential to the growth of each are the same; in fact, that the food consumed by vegetables and animals would prove essentially similar: and *such is actually the case.* The process of digestion in an animal is precisely identical with the process of appropriation or nourishment in a plant. Certain *inorganic* substances, salts and metallic oxides, serve peculiar uses, as lime to give solidity to the bones of an ox; and silica, or the earth of flints, to serve the same end in wheat straw.

We have already spoken of the *elementary* or *ultimate* constituents of vegetables. Out of these are formed the various *immediate* compounds which are found in them. The compound substances found in vegetables are,—1. Albumen; 2. Gum; 3. Sugar; 4. Gluten; 5. Woody fibre; 6. Starch; 7. Extractive; 8. Tannin; 9. Resin; 10. Wax; 11. Fixed and volatile oils; 12. Bitter principle; 13. Free acids; and a few others; to which must be added the mineral, saline, or metallic substances they contain.

Out of the same elementary constituents of vegetable and animal structure are formed the materials composing the blood and all the secretions—fibrin, gelatin, mucus, albumen; all the animal acids—spermaceti, hog's lard, train oil, and other fatty substances; ozmazome, urea, sugar of milk; together with many other matters enumerated by chemists, only some of which are peculiar to the animal kingdom; so that there is no difference between albumen obtained from a vegetable and that which forms, in nearly a pure state, the white of an egg. Albumen in a solid form constitutes the principal part of the almond, and of the kernels of nuts. The juice of a West Indian plant (*Hibiscus esculentis*) contains liquid albumen in such quantities, that it is employed in Dominica as a substitute for the white of eggs in clarifying the juice of the sugar cane. Albumen is common to the vegetable as well as the animal kingdom, and may be easily distinguished from other substances by its property of coagulating or becoming hard and permanently solid by the action of moderate heat, or of acids. It forms a constituent of the serum of blood, of several of the animal secretions, and in a solid form of some of the organized structures of the body. Its composition, from whatever source it may be obtained, is Carbon 52; Hydrogen, 7; Oxygen, 23; and Nitrogen 15 parts, (rejecting fractions,) in every 100.

Let us trace a few more of these comparisons, bearing in mind that nitrogen, as one of the elements into which both vegetable and animal compounds are ultimately resolvable, exists always in greater proportion in flesh, than in grasses. All animal matters do not contain nitrogen; nor are all vegetable substances devoid of it.

Vegetable *gum* is analogous to animal *mucus*. *Gum* is a substance which exudes from certain trees; it appears in the form of a thick fluid, but soon hardens in the air, and becomes solid, when it appears white, or yellowish white, and somewhat brittle. The characteristic properties of gum are its easy solubility in water, and its insolubility in spirit of wine. All the varieties of gum are nutricious as food. Gum is composed of 43 carbon, 51 oxygen, and 6 hydrogen, in 100 parts, or nearly. Mucus, a secretion found on the surfaces of the lining membrane of the intestines, possesses the same characters; and its composition is nearly the same. It may be obtained by evaporating the saliva to dryness; and is then similar to gum-arabic in its general appearance, but rather more opaque. It may be procured also by evaporating to dryness the fluid found in the shell of the oyster, or water in which that animal has been macerated.

Sugar is essentially the same, whether derived from the maple-tree, the sugar-cane, the milk of animals, or even from the urine in the disease known by the name diabetes. Its composition is 28 carbon, 8 hydrogen, and 64 oxygen, in 100 parts, differing not very widely from gum. Sugar exists, naturally formed, in many plants and fruits, especially the sugar-cane. During the Peninsular war, it was largely manufactured from the juice of the beet-root, both in France and Germany. It has also been obtained from grapes, from manna, from carrots, and from honey.

Let us compare *vegetable* gluten with *animal* gelatin. First, of gluten. It may readily be prepared from wheat, or from flour, by the agency of cold water, and pressing out the starch. It has a grey color; is elastic, ductile, and tenacious; soon decomposing when kept long in contact with the air, emitting an offensive odor similar to that of putrid animal matter. Gluten, when burnt, affords similar products to albumen, or white of egg, and differs little from it in composition. It is found in a great number of plants: in acorns, chestnuts, apples, rye, barley, wheat, peas, and beans; in the berries of the elder, and in grapes. Gluten appears to be one of the most nutritive of the vegetable substances; and wheat seems to owe its superiority to other grain, from the circumstance of containing it in larger quantities. *Animal gelatin*, its counterpart from the animal kingdom, enters largely into the composition of many of the animal solids; such as horns, hoofs, and skin, the organized structure of bone, cartilage, and tendon. Isinglass and common joiner's-glue are forms of gelatin, it being readily distinguished from all animal principles by its easy solubility in boiling water. Gluten and albumen, derived from vegetables, differ from other vegetable products, principally in containing nitrogen, and thus assimilating very closely to the chemical character of animal matter. Its composition is 47 parts of carbon, 8 of hydrogen, 27 of oxygen, and 18 nitrogen, in 100 parts, or pounds.

Woody fibre is a substance remaining after the plant subjected to analysis has been exhausted of all its soluble materials by repeated boiling in water and spirit of wine. It forms the bulk of vegetables. Its composition is 52 parts of carbon, and 48 of hydrogen and oxygen, in such proportions as form water, in 100 parts. *Animal fibrin* is a principal constituent of the muscular, red or fleshy parts of animals, and of the blood. It may conveniently be procured by stirring blood recently abstracted, during its coagulation; then washing the fibres till they become colorless, or by digesting small pieces of lean meat in repeated portions of water. As vegetable charcoal is made largely from woody fibre subjected to the action of a close fire, so animal charcoal may be similarly prepared from the muscular parts of animals by the same agency; or, indeed, from any organized structure, containing carbon. In animal fibrin, as it exists in muscle or in blood, one-half the weight is carbon. Fibrin is white, inodorous, and insipid; when dry, it is hard, brittle, and slightly transparent. Strong sulphuric acid blackens it, converting it into charcoal precisely as it does wood. In the roots of plants, in the trunk and branches of trees, the bark and heart-wood, the leaves and flowers, the great basis of the solid parts is woody fibre. It forms by far the greatest part of the heart-wood and bark; there is less in the alburnum, still less in the leaves and flowers. Fibrin holds a similar relation to animal bodies. In 100 parts of fibrin there are 53½ of carbon, hydrogen 7, oxygen 19, and 19 of nitrogen; the presence of nitrogen, or its addition, constituting the peculiarity which distinguishes fibrin from woody fibre.

We have run the parallel far enough for ordinary purposes. Of course, there are some proximate compounds in animals and vegetables which are not common to both, though, with the usual addition of another element, nitrogen, the most varying and unlike substances derivable from the animal and vegetable world are compounded from the same ultimate elements. Let us next briefly glance at a few of these.

Starch.—Starch is procured from different vegetables, but particularly from wheat, or from potatoes. To make starch from wheat, the grain is steeped in cold water till it becomes soft, and yields a milky juice by pressure; it is then put into sacks of linen, and pressed in a vat filled with water: as long as any milky juice exudes, the pressure is continued, the fluid becomes gradually clear, and a white powder subsides, which is starch. *Arrow-root*, *tapioca*, and *sago*, are nearly pure starch. Starch, or in its absence, coagulated mucilage, forms the greatest part of the seeds and grains used for food ; and they are generally combined with gluten, oil, or albumen: in corn with gluten, in peas and beans with albumen, and in rapeseed, hemp-seed, linseed, and the kernels of most nuts, with oils. Its characteristic property is its easy solubility in boiling-water, and its insolubility in that fluid when cold. The ultimate composition of starch is, carbon $43\frac{1}{2}$, oxygen 50, hydrogen $6\frac{1}{2}$; or, in other words, carbon $43\frac{1}{2}$, and oxygen and hydrogen in such proportions as form water; differing chemically from gum, only in a very slight variation in these quantities.

Extract, or the *extractive principle*, exists in almost all plants. It may be procured in a state of tolerable purity from saffron, by merely infusing it in water, and evaporating the solution. It may likewise be obtained from catechu, or *terra Japonica*, a substance now imported in immense quantities from India, and used in calico-printing. This substance consists principally of astringent matter and extract. By the action of water upon it, the astringent matter is first dissolved, and may be separated from the extract. There are almost as many varieties of extract as there are species of plants. It is not, nor can it be used singly as an article of food; but is probably nutritive when united to starch, mucilage, or sugar. Its composition is carbon, hydrogen, oxygen, and a little nitrogen.

Tannin, or the *tanning principle*, may be procured by the action of cold water on bruised grape-seeds, or pounded gall-nuts, and by the evaporation of the solution to dryness. It is a yellow, highly-astringent substance. If tannin be distilled in close vessels, the principal products are charcoal, carbonic acid, and inflammable gases, with a minute quantity of volatile alkali. Hence its ultimate elements seem the same as those of extract, but probably in different proportions. Tannin is not a nutritive substance, but is of great importance in its application to the art of tanning. When skins (which are composed almost entirely of gelatin or jelly) are exposed to solutions containing tannin, they slowly combine with that principle; their fibrous texture and coherence are preserved; they are insoluble in water, and no longer liable to putrefaction; and, by subsequent processes of rolling and drying, form leather. In general, in this country, the requisite tannin is made from the bark of the oak; but the barks of other trees, and the wood and leaves of many shrubs, yield it abundantly.

Resin is very common in the vegetable kingdom. One of the most usual species is that afforded by the different kinds of fir. When a portion of the bark is removed from a fir-tree in spring, a matter exudes, which is called turpentine. By heating this turpentine gently, a volatile oil rises from it, known familiarly as "spirit of turpentine." A more fixed substance remains, which is common yellow rosin. Resins are insoluble in water, but very soluble in spirit of wine; in this respect reversing the character of gum. Sandarac, copal, mastic, elemi, are resins obtained from various trees; and the list is very numerous. Tar and pitch principally consist of resin in a partially decomposed state. Tar is made by slowly burning the fir; and pitch, by the evaporation of the more volatile parts of tar. One hundred parts of common resin contain 76 of carbon, 13.3-10ths of oxygen, and 10.7-10ths of hydrogen.

Wax is found in a number of vegetables, from their berries and the surfaces of their leaves. Its combustible property, like that of resins, is well known. The wax of the vegetable kingdom seems to be precisely of the same nature as that afforded by the bee. Its constituents are, carbon 81.7-10ths, oxygen 5½, hydrogen 12.6-10ths, in 100 parts.

Fixed oil is obtained by expression from seeds and fruits. The olive, the almond, linseed, and rape-seed, afford the most common vegetable fixed oils. Their common properties are well known. They are lighter than water; and many of them congeal at a lower temperature than that at which water freezes. They all require, for their evaporation, a higher temperature than that at which water boils. The products of the combustion of oil are, water and carbonic acid gas. The fixed oils are very nutritive substances: they are of great importance in their applications to the purposes of life. Fixed oil, in combination with soda, forms the finest kind of hard soap. Let us compare the ultimate analysis of olive or *vegetable* oil with that of spermaceti oil, which is of *animal* origin:—

OLIVE OIL.		SPERMACETI OIL.	
Carbon, - - - - -	72.2-10ths	Carbon, - - - - - - - -	50.
Oxygen, - - - -	9.4-10ths	Oxygen, - - - - - - - -	5.
Hydrogen, - - - -	13.4-10ths	Hydrogen, - - - - - - -	45.
	100.		100.

The greater proportion of hydrogen in spermaceti oil renders it a fitter fluid for combustion in lamps than *vegetable* fixed oils; but the ultimate composition of the two, as far as the *list of ingredients* is concerned, is evidently the same.

Hog's lard, butter, and spermaceti, may be regarded as animal fixed oils.

Volatile, or *essential oils*, differ from fixed oils, in being capable of evaporation by a much lower degree of heat. Volatile oils give the peculiarity of odor to the peppermint plant, to camomile, and numberless other shrubs and trees; existing in the flowers of some of them, and in the leaves and inner bark of others. Thousands of minute insects may usually be seen in the stalk and leaves of the rose; but none of them are ever observed on the flower. One reason for the existence of fragrant volatile oil in the plants may be, the preservation of the parts destined to the propagation of the species from the destructive ravages of insects and animalculæ which feed on the bodies of plants. So, those woods that contain aromatic oils are remarkable for their indestructibility, as cedar, rose-wood, and cypress. The volatile oils inflame with more facility than fixed oils; and afford, by their combustion, different proportions of the same substances—namely, water, carbonic acid, and charcoal or carbon. Volatile oils consist of carbon, hydrogen, and oxygen; but, as yet, no accurate experiments have decided their relative proportions.

The *bitter principle* is very extensively diffused in the vegetable kingdom. It is found abundantly in the *hop*, in the common broom, in camomile, and in quassia. The natural bitter principle is of great importance in the art of brewing. It checks fermentation, and preserves fermented liquors, and doubtlessly plays an important part in the healthy nutrition of the living vegetable. An intensively bitter substance is found in bile, or the fluid secreted by the liver of animals. The gastric juice, or fluid secreted by the stomach, is not only the principal solvent in digestion, but has the same antiseptic property, or resists putrefaction as strongly as the vegetable bitter principle.

Systematic writers on chemistry have enumerated a long list of proximate constituents, both of animal and vegetable structure. Many of them, as we have seen, are but the counterparts of each other. It is needless to specify them all.

The earths found in plants are four, all of them, as previously related, of metallic origin. These are, 1*st*, Silica, or the earth of flints, the base of which is the metal silicon; 2*d*, Alumina, or pure clay, the base of which is the metal aluminium; 3*d*, Lime, the metallic base of which is calcium; and, 4*thly*, Magnesia, the metallic base of which is magnesium. All of these are similarly found in animals; among them, lime, most largely in their bones and shells. Some insects are almost entirely composed of silica: iron, existing in peat-mosses and in many vegetables, gives the red color to the blood. None of these exist in a free and uncombined state, in either the vegetable or animal world; most commonly in combination with acids, of which we may observe, that some plants contain free vegetable acids in large proportion, as the common sorrel or sour-leaf. The applications of the vegetable acids are well known. The agreeable taste and wholesomeness of various vegetable substances used as food, materially depend upon the vegetable acid they contain. Phosphoric acid (united to lime in bones) is found free in the onion; and the sulphuric, muriatic, and nitric acids, though they cannot with propriety be considered as vegetable products, exist in many saline compounds, as part of the inorganic constituents of plants as well as animals. They are all variously compounded of carbon, hydrogen, and oxygen. Then, too, the saline compounds found in plants correspond with many similar compounds found in animals. Potash and soda, blended with acids, are found in blood, in the various animal secretions, in the leaves and stalks of vegetables ; sparingly in animal matter, very largely in sea-weed yielding soda, and in the ashes of burnt wood yielding potash.

Plants, like animals, are produced by ordinary generation ; and though we meet with various instances of production by the generation of buds and bulbs, or of slips and offsets, the similarity, instead of being hereby diminished, is only drawn the closer; for we meet with just as many instances of the same variety of propagation among animals. Many species of worms are capable of increase by buds, bulbs, or offsets; and some of these animals, like the house-leek and various grasses, by spontaneous separation. A twig of myrtle will live and grow, if placed in the ground, because it contains in itself all the parts of a perfect plant; but that is independent of the provision nature has made for the propagation of the plant naturally, from the seed buried in the earth. Something approaching very closely to the character of a sexual, or reproductive system of organs, is visible in the flowers of plants. The pistil is the organ which contains the rudiments of the seed; but the seed is never formed as a reproductive germ, without the influence of the pollen, or dust on the anthers. This mysterious impression is necessary to the continued succession of the different vegetable tribes. It is a feature which extends the resemblances of animal and vegetable existence, and establishes, on a great scale, the beautiful analogy of nature. Seeds which are shed devoid of this fructifying dust, are precisely analogous to eggs over which the influence of the male bird has never been exerted. Vitality is therefore essential to the germination of seeds : life will remain dormant, inert for an indefinite period,—and then change its form into that of active vitality, if that seed be placed under the action of moisture, heat and air. So that the scriptural inquiry, " How can a seed quicken, unless it die ?" is not to be taken as the enunciation of a scientific truth, but as an illustration drawn from the ordinary apprehensions of mankind.

The utmost period of time to which seeds may be kept, and be enabled to retain their life, and, consequently, their power of growth, has not been accurately determined; but we have proofs enough to show that the duration may be very long. A paper of melon seeds, found in the year 1762 in a cabinet of Lord Mortimer, and apparently collected in 1660, were then sown, and produced excellent fruit; and, more latterly, seeds buried in the ruins of Herculaneum, and others brought from Egypt,—found in the tombs that are more ancient than the time of Moses,—have been proved to retain their vitality. *Animal seeds*, or, more properly, EGGS, when perfectly impregnated, appear capable of preservation quite as long. This inert condition of seeds is not unlike what occurs in the hollows of our waste lands, in reference to animal matter. When these have been for some time filled with stagnant water, we not unfrequently find minute eels, minnows, and water insects there, and wonder how they could get into such a situation. But the mud which has been emptied out of a fishpond has been, perhaps, thrown into these very hollows; or the eggs of the animals or insects have been carried, mixed with other materials, into the same place, and then waiting, it may be, year after year, the accidental, yet necessary, circumstances of warmth, water, light, and air, they have been stimulated to active life. One species of locust appears, *in numbers*, only once in seventeen years; and the palmer-worm once only, in similar numbers, in thirty years. Something analogous to this occurs in reference to various species of grub and fly, as observed by practical farmers; and the reason of it is, that the integument, or outer covering, of many minute ova, ensures their protection and their vitality during long periods. The eggs of the gad-fly could never be hatched on the horse's back: their covering preserves them entire and vital, till, by the itching sensation their presence excites, the animal is tempted to lick the spot, and so convey them to his stomach, the only place where it is destined they should come to maturity. Numberless small fish are seen in the salt pans at a village in Hesse Darmstadt: the ova of these fish have been conveyed there by birds, and, it so happens, are deposited in a place where the necessary conditions exist for their development.

The essential difference between the egg of a barn-door fowl, and the ovum or egg, which ultimately becomes a calf, a foal, or a human being, is, that the one, after the stimulus of impregnation has been applied to it by the male, comes to maturity *within* the body of its parent; in the other instance, it is *hatched* after its expulsion. In fish and frogs, the spawn or ova is first expelled, then the male passes over it. The seeds of plants are exactly analogous to eggs; in ordinary instances the germs and the fecundating material which ensures reproduction, being both found in the same flower, and, of course, attached to the same stalk. The various species of *fruit* are but contrivances for the shelter and preservation of seeds, as the pippins of the apple, or of the orange and lemon: these, when fully ripe, left to themselves, would fall, become rotten, or in other words, subjected to common chemical agencies and exposing the seed within, form, in the first instance, a manuring material for the perpetuation of the plant or tree which had yielded it.

Plants derive all their sustenance from the spot on which they are placed; and, solely for this reason, are not provided with a peculiarity which distinguishes animals, namely, a set of movable levers or bones, destined to carry them about from place to place in quest of food, and of muscles, or red, fleshy, contractile organs, intended to act upon those passive levers: and yet there are some plants that seem fairly entitled to the character of locomotive or migratory. A familiar instance of this occurs in the *strawberry* genus: such plants grow from a new bulb, or knob, or radicle, while the old root dies away; in consequence of which, we can only conclude that the living principle of the plant has quitted an old, decayed, and ruinous mansion, to take possession of a new one; so much so, that were a person to plant the orchi, or the devil's-bit, in his garden, and to search for it in the same spot, after an interval of seven years, he would find it several hundred yards from the spot where he had planted it.

There are some creatures that throw off their outer covering annually: so the shrubby cinquefoil, indigenous to Yorkshire; and other plants and trees, which, sending forth, every spring, new colonies, by means of runners, (as we call them,) shortly obtain a settlement for themselves, and break off all connexion with the parent stock.

The blood of plants, like that of animals, is of an extremely compound character. If blood be allowed to stand in a vessel, it soon separates into a clot, and a fluid in which that clot floats. Each of these is again divisible into several other matters. So with the fluid that circulates in the vessels of a tree. And, as from blood the various dissimilar solid and fluid secretions and excretions are formed, building up the animal fabric,—as bone, muscle, bile, urine, jelly,—so, from this common current of vitality, the *sap*, plants, like animals, secrete a variety of substances of different, and frequently of opposite powers and qualities—substances nutritive, medicinal, or destructive. The flesh of the viper is healthful, his poison is deadly; the root of the Indian cassava is poisonous, its leaves are eaten as ordinary food. Every one is familiar with the fact, that some of our domestic animals will eat with impunity vegetables that would be poisonous to others. Then, too, how close is the analogy between the torpidity of the squirrel, or the dormouse, or the swallow, during the winter, and that of deciduous plants during the same season: we know, that if proper care be exercised, they may be removed in that state without endangering their vitality. Many animals are amphibious—they can live equally well on land or in the water; and the vegetable world is not without illustrations of a similar power. Indeed, the instances of resemblance between animal and vegetable life are innumerable. Some vegetables, like a few birds, more insects, and most of our forest beasts, appear to sleep through the day, and become active at night; while the greater number of them, like the great majority of animals, fold or hang their leaves at sunset, and appear invigorated with the return of morning. Like animals, the duration of their existence is equally various.

We have already observed, that plants and animals convert the materials of nutriment they receive into their own substance precisely by the same agency, and that there is no essential difference between the *ultimate* composition of the requisite materials in either instance. If this be so, as in the farther progress of this inquiry we shall unquestionably prove, it would be fair to expect that the digestive organs of animals,—in fact, all that is connected with reproduction and growth,—have their counterpart in plants; and such is actually the case. Let us briefly review the *anatomy*, or organized structure, of a plant, and compare that structure with the anatomy of a horse.

Every plant, examined as to the external structure, displays, at least, four systems of organs, or some analogous part. First, the ***Root;*** Secondly, the ***Trunk*** and ***Branches***, or ***Stem;*** Thirdly, the ***Leaves;*** and, Fourthly, the ***Flowers*** or ***Seeds.***

The stem of any tree consists of the pith in the centre, the wood surrounding the pith, and the bark which covers the whole. A tree completely divested of bark, is precisely in the predicament of an animal deprived of its hide. The pith consists of bundles of minute hollow tubes, or vessels arranged horizontally; the wood and inner bark, of long tubes or vessels bound together in a vertical position, so as to be capable of carrying vegetable blood up and down between the roots and leaves. When a piece of wood is sawn across, the cut ends of these tubes are as distinctly perceptible as the divided arteries and veins in the stump of an amputated limb. Branches are only prolongations of the stem, and have the same character.

The bark of the stem and root is divisible, like the covering of animals, into *epidermis,* (analogous to the scarf skin which rises over a blister,) and *true skin*, or *inner bark*, which alone is vascular and vital. In forest trees, and in the larger shrubs, the bodies of which are firm, the outer bark, epidermis, or scarf skin, is a part of little importance; but in reeds, grasses, and plants having hollow stalks, as wheat and oats, it is of great use, and is exceedingly strong, from the provision of its containing siliceous earth, or the oxide of a metal, as already stated. The analogy between this contrivance and the shell of the lobster, or the covering of insects, is very obvious.

As the *root* tapers away, the pith gradually disappears, the bark thins out, the wood softens, till the white tendrils, of which its extremities are composed, consist only of a colorless, spongy mass, in which the vessels or tubes that carry on the circulation lose themselves.

The leaf is an expansion of the twig. Each separate leaf is precisely analogous in its action to the gills of a fish, or the lungs of an ox, or of a human being. The fibres which are seen to branch out from the base over the inner surface of the leaf, are prolongations of the vessels of the wood, precisely as the lung of an animal is but an outspread division of blood vessels. A powerful sucking and forcing pump called the *heart*, is essential to drive human blood along large vessels to its ultimate division; but the vessels of plants are *capillary*, that is hair-like, exceedingly minute, and therefore a central power or heart is not necessary. So there are capillary vessels in animals, and there the action of the heart is not so sensibly felt. Their minuter blood vessels are believed by some to be contractile. The green exterior portion of the leaf is a continuation of the inner bark, and communicates directly with its vessels. Most of the vessels of the living plant are full of sap or vegetable blood in almost continual motion. In spring and autumn the motion is more rapid; in winter it is sometimes scarcely perceptible. From the spongy part of the root the sap ascends through the vessels of the wood in virtue of that capillary attraction already adverted to, until it is diffused over the inner surface of the leaf. By the vessels in the *green* of the leaf it is returned to the bark, and through the vessels of the inner bark it is returned to the root. In man and four-footed animals the blood is driven from the heart along the arteries, and returns back by the veins; but previously to being sent along the circulation a second time, it is driven into the lungs, is there subjected to the action of the air, (whence the necessity for breathing,) and then, returned to the other side of the heart, is again fitted to recommence its journey. Animals derive a considerable portion of their nutriment from the change effected on the air by the action of the lungs: something is absorbed as well as given out. The leaves of plants perform the same office. In the sunshine, the leaves are continually absorbing carbonic acid as well as other matters from the air, and giving out oxygen gas. In breathing, carbonic acid is given off, and not triflingly. The air becomes instantly poisonous, if that gas accumulate as rapidly as it did when some hundreds of our brave countrymen were pent up in the confined space of the "black-hole" at Calcutta. The leaves then, are continually appropriating carbon, the basis of charcoal, from the atmosphere. When night comes, this process ceases, and they begin to absorb oxygen and give off carbonic acid. Hence the mischief of placing large plants, in great numbers, in bedrooms. It would result from the above arrangement, that plants grow very little, perhaps not at all, during the night. Now, during the summer months, when they are provided with leaves, the days are long, the nights short; in winter, when plants are torpid or stationary, the nights are long, and the day comparatively brief. Sunshine is necessary, in order to enable plants to decompose carbonic acid and appropriate the carbon. It is owing to this law, that in the cold northern regions where, in their highest latitudes, the sun once risen never sets again during the whole of their short summer, vegetation almost rushes up from the soil; almost literally, plants may be *seen* to grow. The green leaves are continually gaining from the air and never losing; ever taking in and never giving off carbon, since no darkness interrupts or suspends their labors.

Every child is led to regard the *root* of a plant as the organ from which the vegetable *grows;* not merely as attaching it in the erect position to the spot, but as forming the medium of communication between all that is above ground, and the food the soil is supposed to yield. But it is not so obvious to us, who, in many senses, are but children of a larger growth, that the leaves of an oak or an ash spread their broad leaves into the air for the very same purpose as the roots diffuse their fibres through the soil. The only difference is, that while the roots absorb chiefly liquid, the leaves inhale almost solely gaseous food. The human lungs expose the blood to air just as, in the leaf, the sap is submitted to the same agency; and in each instance there is a double use to which these organs are destined: they not only change the character of the circulating fluid, but permit, by the decomposition of air, the absorption of some of its elements as food for the animal or plant. So that, in truth, *we live and are nourished partly upon the air we breathe*, and *so is a cabbage* upon the atmosphere it decomposes. If the experiment be repeated—it has often succeeded—that of burying the branches of certain trees in the soil and elevating the roots in the atmosphere, turning the vegetable upside down—there is as it were an inversion of its functions—the roots will produce buds and leaves, and the branches shoot out into root-like fibres and tubes. The experiment succeeds well with the willow.

Though plants give out in the night carbonic acid, this process does not go on so rapidly, or to such an extent, as to destroy the balance in their favour of what has been absorbed during the day.—The quantity absorbed through the leaves varies with the season, the climate, and the kind of tree; it is also modified by the nature of the soil. It has been ascertained, however, that in our climate, on an average not less than from one-third to three-fourths of the entire quantity of carbon contained in the crops we reap from land of average fertility, or (pretty nearly) the amount of charcoal a burnt haystack would yield, is really obtained from the air.

The varied and equally important uses of a leaf appear, to the contemplative mind, singularly beautiful.

> "In human works, though laboured on with pain,
> A thousand movements scarce one purpose gain;
> In God's, one, single, can its ends produce,
> Yet serves to second, too, some other use."

Then, too, the contrivance of so *many* expanded leaves! The air contains only one gallon of carbonic acid in every 2500; and this fortunately, rather we ought to say *designedly*, only in a state of *mixture*, not of combination, with the elements of the atmosphere, and therefore more easily separable; were the proportion larger, it would prove poisonous to the animals that live in it, deriving also a portion of their nourishment from *another* element of the atmosphere equally essential to plants. Now, in order to catch this minute quantity of carbonic acid, the tree hangs out thousands of square feet of leaf, in perpetual motion through the ever-moving air; and thus, by the conjoined labours of millions of pores, the substance of whole forests of solid wood is slowly extracted from the fleeting winds. Is not this wonderful! Green stems, and stalks of grasses, absorb carbonic acid as the leaf does; and thus a larger supply is afforded when the growth is most rapid, or when the short life of the annual plant demands much nourishment in a limited time. The slender and comparatively dry leaves of the pine and the cedar perform the same functions as the large and juicy leaves of the fig-tree, the cabbage, the walnut, or the rhubarb plant. That plants derive so large a proportion of their nutriment, not from the soil, but from the air, is evident from observing the habitudes of many found in hot climates, which refuse to vegetate except in a soil so dusty that no moisture can be extracted from it, and perish if water be ignorantly supplied to them. A well-known Jamaica shrub was long propagated in our own stoves by cuttings, which, though freely watered, could never be made to produce any signs of flowers or fruit, notwithstanding that the cuttings were several feet in length every season. By accident, a pot with young cuttings was mislaid and forgotten in the royal garden, and having no water given it, it was thereby reduced to its healthy dryness, and then every extremity was seen to produce a flower. It is an opinion common to many able men of the present day, that *many* plants derive the *whole* of their support from the surrounding atmosphere; if this be true of some, it is partially true of all, and must very materially modify all our plans intended to increase the product of the soil. There are, we say some plants which have *no root* whatever, as in the prickly-pear or Indian fig; many are attached only to the hard surface of a stone, and propagate their kinds by offsetts, without any other vegetable organs. Now there are some quadrupeds that appear to derive nourishment in the same way. The *sloth* never drinks: it imbibes moisture by its skin, it trembles at the feeling of rain; so the olive cavy, and the ostrich, are noted by the Arabs as avoiding water, and yet these creatures are as juicy and well supplied with fluids as any with which we are acquainted.

If leaves are necessary for the existence of the individual tree, the FLOWERS are necessary as generative organs for the continuance of the species. Even in that class of plants where no flowers are distinct, still there is every reason to believe that the production of the seed is effected in the same way as in other plants. Mosses and lichens, which belong to this family, have no distinct roots, but they are furnished with filaments which perform the same functions; and even in mushrooms there is a system for the absorption and exposure of the sap to the air. Of all parts of plants the flowers are most refined, the most beautiful in their structure, and appear as the masterwork of nature in the vegetable kingdom. The elegance of their tints, the variety of their forms, the delicacy of their organization, and the adaptation of their parts, are all calculated to awaken our curiosity and excite our admiration. The ancients had observed, that different date-trees bore different flowers; and that those trees producing flowers, containing in their centre organs termed by botanists "*pistils*," bore no fruit unless in the immediate neighbourhood of such trees as produced flowers differently arranged in their central structure, and containing "*stamens*." The great naturalist, Linnæus, has arranged the whole Vegetable Kingdom into twenty-four classes, as deducible from the *numbers* of these sexual organs in each flower. The numbers of the *stamens* and *pistils* in each, their arrangements or their division, are the circumstances which guided him, and enabled him to form a system of botany admirably adapted to assist the memory, and denoting well the analogies of all the essential parts of plants.

The SEED, the last production of vigorous vegetation, is wonderfully diversified in form. Being that part which is of the highest importance, it is found defended above all other parts of the plant; sometimes by soft pulpy substances, in addition to a hard shell, as in apricots and plums; by thick membranes, as in common garden peas and beans; by hard shells, or a thick coating, as in corn and grasses. So, similarly, the eggs of the ostrich, which are destined to be hatched by the sun in the sand where they are deposited, are invested with a strong shell, not firmer, comparatively, than the encasement surrounding every one of the myriads of ova or eggs in the roe of a cod-fish or herring. If we were to pursue the analogy more closely still, between the structure of a grain of wheat and that of the egg of a bird or the ovum of a quadruped, we should find the parallelism singularly minute and exact; but this is the province of the physiologist: it is enough for our purpose to cite a familiar illustration. When potatoes are cut in pieces for seed, every gardener knows that, if each separate piece have not an "eye" upon it, the fragment will not grow. If it vegetate, it will be from that living spot or "eye:" the remainder will serve to minister nutriment to the infant plant before it can pierce the soil; it will strike upwards and downwards; the original bit of potatoe will be absorbed, or perish. So, a common garden bean is divisible into two equal halves or lobes, which form the organ of nourishment; but the young plant springs not from these, but from the plume or small white point between their upper part, and the young root is found like a small curved cone at the other end of the seed. In wheat, and many grasses, the organ of nourishment is not divisible as in a bean; but the same principle holds true not only of all *seeds*, but of bird eggs, and the rudimentary ova of all animals.

CHAPTER IV.

Of the Elementary Composition of *Water;* of the Composition of the *Atmosphere;* and of the artificial Application of Water to Grass Lands.

We have already traced some of the more prominent analogies obviously existing between vegetables regarded as *alive*, and animals. We have shown that the ultimate, and many of the proximate, elements of both are the same—that they are nourished or destroyed by the same agencies. Before we describe minutely the nature of the process of *nutrition* and growth, it is necessary to understand the chemical composition of the ATMOSPHERE, which is related similarly to lungs as to leaves; and of WATER, necessary alike to plants as to animals.

If one measure of hydrogen gas, and half as much oxygen gas, or, by weight, eight grains of oxygen gas, and one grain of hydrogen, be mixed in a dry glass over mercury, and the mixture set on fire, the result will be the formation of *pure water*. So water is formed, and is sometimes seen collected, from the burning of the common carburetted hydrogen, in the street or shop gas-lamps ; the effect being nothing more nor less than the combination of the oxygen of the air with the burning hydrogen. Water is the result of their union, and combustion, or burning, EFFECTS that union. The gas in the pipes would not, could not, burn, if a free supply of air, or rather of oxygen, contained in that air, were cut off ; and *water* is the PRODUCT of their union. So that perfectly pure water is, chemically speaking, not a simple undecompounded element, but a compound of two elements—*oxygen* and *hydrogen ;* both of which, as elements, enter largely into the composition of both animal and vegetable matter.—Oil and fat owe their utility in yielding light in lamps to the presence of hydrogen. Its presence causes turpentine and rosin to blaze and burn readily ; while oxygen is equally an ultimate ingredient in all vegetable and animal substances. These details may appear scientific ; but the action of manure is not to be understood without them, or rather the nature of vegetable and animal growth, and all that favors or retards it.

The purest NATURAL water we can obtain is procured by melting snow, or collecting rain-water, in stations distant from the smoke of a town. If *pure* water be requisite for the experiments of a chemist, it is generally obtained by distilling rain-water in glass vessels,—that is, raising it into steam by heat, then allowing that steam to condense, by passing it through cold pipes. The characters of *absolutely pure* water are—that it is perfectly transparent and colorless, limpid, not sparkling, insipid, unpleasant, and sickly to the taste, and is lighter than common river or spring water. One hundred cubic inches of water weigh 252½ grains ; it is 828 times heavier than air ; and when expanded into steam, occupies 1700 times its previous space. Steam is not nearly so heavy as the air. Water readily absorbs many gases : what is called soda-water, is water impregnated with fixed air, or carbonic acid gas. It absorbs ammoniacal gas readily in large quantities, forming what is sold in the shops as spirit of hartshorn.

Of the constitution of SEA WATER, the proportions and nature of its saline ingredients, one of their final uses in vegetation, and especially the relatively large proportion of carbonic acid it contains, we will speak, when adverting to the necessity and wisdom of such arrangement.

Neither is the ATMOSPHERE animals breathe and decompose, and in which living plants carry on analogous operations, a simple element. *Air* is a compound of two gases, *oxygen* and *nitrogen,* in the proportion of two parts of *nitrogen* to one of *oxygen.* 100 cubic inches of air weigh 30 grains. The atmospheric pressure of the air upon the earth's surface, at the level of the sea, is equal to a weight of 15 pounds upon every square inch, and is capable of supporting a column of water 34 feet high, or of mercury, 30 inches. For this reason, a pump will not work, if the depth of the shaft be greater than 34 feet ; and the height to which the quicksilver will rise in the weather-glass always corresponds to the pressure of the atmosphere; that is to say, the weight of the mercury in the tube is exactly equal to the weight of a column of air the same thickness, only the height of the atmosphere. The air receives its heat entirely from the earth: hence the phenomena of cold which we perceive the higher we ascend from the earth's surface.

If water be passed through a red-hot gun-barrel, it will be decomposed; its oxygen will unite with the metal, its hydrogen will escape, and may be collected in the form of a gas, and preserved in a bladder. Many similar experiments demonstrate the composition of water. It may be *made*, in fact *is* made, in almost every instance where a combustible body unites with the oxygen of the air: it may be separated into its elements, *unmade*, so to speak, by a variety of processes. *Synthesis* is the term chemists apply to the former; *analysis* to the latter mode of demonstrating its composition.

Now, it is most materially important, in connexion with our future inquiries, to observe, that there are other matters, not essential to the composition *either of* AIR *or* WATER, *that* IN NATURE *are always found mechanically mixed up or associated with each, and this as an express provision for the sustenance of animals and plants.*

The atmosphere is not compounded purely of oxygen and nitrogen: it contains *carbonic acid* and *watery vapor*. The proportion of carbonic acid in the atmosphere may be regarded as equal nearly to one part in a thousand, estimated by weight. The quantity varies according to the seasons, but the yearly average remains continually the same.

And the rain that descends from the clouds contains *ammonia*, one of the elements of which, as previously stated, is nitrogen. Experiments confirm the theory upon which the presence of ammonia in rain-water might reasonably be expected. If a few hundred pounds of rain-water be carefully subjected to distillation, and the first two or three pounds evaporated, with the addition of a little muriatic acid, a very distinct crystallization of muriate of ammonia, or *sal ammoniac*, may be obtained, which chrystals have a brownish-yellow color. If a little sulphuric or muriatic acid be added to a quantity of rain-water, and the mixture boiled to dryness, the ammonia remains as the residue, in combination with the acid employed; and it may be detected by the addition of a little powdered lime, which, combining with the acid, sets the ammonia free, and is recognised by its pungent smell. The sensation which is perceived upon moistening the hand with *rain*-water, so different from that produced by washing it in *pure* distilled water, and to which the term *softness* is applied, is owing to the presence of carbonate of ammonia in rain-water.

How this ammonia is generated in rain-water, the importance and utility of the fact, and the uses of carbonic acid in the atmosphere, are matters so closely identified with living processes in animals and plants, that we must here simply confine ourselves to the statement. We have now the *preliminary materials* for the examination of nutritive actions. When these, as they exist naturally, are understood, we shall be able to say what are those substances called FERTILIZING, which may be useful in given instances as manure, whether their application may be suitable or injurious; just as a knowledge of anatomy and physiology is necessary to the physician who would amend the diseased conditions of the body. He must know what is the nature of *healthy* and *ordinary* action in the living frame, before he can understand and alter diseased action.

The artificial application of *water* in large quantity to land, is a subject well understood, and its effects accurately marked and recognized in many parts of the world that have been regarded as strictly agricultural localities during a long succession of ages. Irrigation is, in truth, a mode of applying the weakest of liquid manures, on a very bold scale, to grass-lands. Almost every farmer has a mode of accounting for the highly-fertilising effects of irrigation. Davy added another to the list of explanations. He thought that a winter-flooding protected the grass from the injurious effects of the frost. He examined, with a thermometer, and with his usual address, the water-meadows near Hungerford, in Berkshire, and ascertained that the temperature of the soil was ten degrees higher than the surface of the water, and that, too, on a frosty March morning. He remarked, also, a fact that most farmers will confirm, that those waters which breed the best fish are ever the best fitted for watering meadows.

He appears, however, never to have steadily investigated the chemical composition of river-water with regard to its uses in irrigation; and in consequence, he knew little of the value of some of its impurities to vegetation. Thus, if the river-water contains gypsum, (sulphate of lime,) which it certainly does if the water is hard, it must, under ordinary circumstances, on this account alone, be highly fertilising to meadows, since the grasses contain this salt in very sensible proportions. Calculating that one part of sulphate of lime is contained in every two thousand parts of the river-water, and that every square yard of dry meadow-soil absorbs only eight gallons of water, then it will be found, that by every flooding, more than *one hundred weight* and *a half of gypsum per acre* is diffused through the soil in the water: a quantity equal to that generally adopted by those who spread gypsum on their clover, lucern, and sainfoin crops as a manure, either in a state of powder, or as it exists in peat-ashes.

And if we apply the same calculation to the organic substances ever more or less contained in flood-waters, and if we allow only 25 parts of animal and vegetable remains to be present in a thousand parts of river-water, then we shall find, taking the same data, that every soaking with such water will add to the meadow nearly two tons per acre of animal and vegetable matters; which, allowing in the case of water-meadows five floodings per annum, is equal to a yearly application of ten tons of organic matter. The quantity of foreign substances present in river-water, although commonly less, yet very often exceeds the proportion we have calculated to exist.

There is no stream more celebrated for its prolific water-meadows than the Itchen in Hampshire; and in no part of England is the system of irrigation better understood and more zealously followed. The water of this river, taken from above the city of Winchester, contains in 10,000 parts, after all its mechanically suspended matters have subsided, about 2.2-3d parts, namely—

Organic matter, - - - - - - - - - - - - - - - -	0.02 parts.
Carbonate of lime, (chalk,) - - - - - - - - - - -	1.89
Sulphate of lime, (gypsum,) - - - - - - - - - - -	0.72
Muriate of soda, (common salt,) - - - - - - - - - -	0.01

The water of lakes is usually still more surcharged with foreign substances than those of rivers; and from the use of such waters, especially if an occasional or winter stream of water passes through them, we have witnessed great fertilising effects produced on meadow land.

CHAPTER V.

Of the Nature of Vegetable Growth; the true use of Vegetable Mould or Humus; and of the Sources of the Elementary Constituents of Plants.

From the facts detailed in the foregoing sections, the development or nutrition and growth of a plant requires the presence, first, of substances yielding *carbon* and *nitrogen*, as elements to the growing structure; secondly, of water, furnishing in itself two very important elements, namely *oxygen* and *hydrogen*, besides adventitious matters; and lastly, a soil, to yield the saline, earthy, metallic, or other organic materials essential to vegetable life.

The fertility of every soil is generally supposed to depend on the presence in it of a peculiar substance, named "*humus*." This substance, *incorrectly* supposed to form the principal nutriment of plants, and to be extracted from them by the soil in which they grow, is nothing more than *vegetable mould*, the product of the decay of other plants.

Adherence to the above incorrect opinion, has hitherto rendered it impossible for the true theory of the nutritive process in vegetables to become known, and has thus deprived us of our best guide to a rational practice in agriculture. Any great improvement in that most important of all arts, is inconceivable without a deeper and more perfect acquaintance with the *substances* which really nourish plants, and with the *sources* whence they are derived. It was supposed that by the aid of water, "humus" is rendered capable of being absorbed by the roots of plants. If it be, it must be in some altered form; for if a portion of good mould be long subjected to the action of water, that fluid will not dissolve more than a hundred-thousandth part of its weight, and contain only soluble organic matters, and the salts which are contained in the rain-water which has fallen upon it. Decayed oak wood, beech, and fir, yield the same results.

Let us inquire whence the grass in a meadow, or the wood in a forest, receives the carbon essential to the formation of that WOODY FIBRE constituting the principal weight and solid bulk of the tree or plant. Whole tracts of open country in the green wilds of America, immense woods and forests in all parts of the world, receive no carbon in the form of manure; how does it happen that the soil, instead of being exhausted through the annual production of vegetation for ages, becomes every year richer in carbon? In other words, a certain quantity of carbon is taken every year from an unmanured forest or meadow, in the form of growing wood or grasses; and in spite of this, the quantity of carbon in the soil augments; it becomes richer in vegetable mould, in humus—so much so, that in process of time it will not support the trees which stood upon it; they fall, and the surface becomes a peat-moss, burying huge trunks in its bosom. Plants give back more carbon to the soil than they take from it; it is evident, then, that their growth must depend on the reception of carbon as food from another quarter. It is not denied that manure, rightly chosen and applied, exerts an influence upon the growth of plants; but it neither serves for the production of the carbonaceous woody fibre, nor has any influence upon it, because we find that the quantity of carbon produced by manured land is not greater than that yielded by lands which are not manured. The discussion as to what manure really produces, has nothing to do with the present question, which is, the origin of the carbon as the principal element of the woody fibre. It must be derived from other sources; and as the soil does not yield it, we are driven to look for it in the atmosphere.

Now, we have already stated that the air contains carbonic acid; and if the reason of its presence there be not, that it may yield carbon to plants, what other use can be assigned to it? Animals do not derive their chief sustenance from the air: to them pure and unmixed carbonic acid is poisonous; though taken into the stomach it is grateful. Besides, we know it to be a fact, that *during the sunshine of day* the leaves of plants are continually absorbing this very gas, and giving out oxygen; and if not for their nutrition and growth, for what other purpose? Carbonic acid being a compound of carbon and oxygen, they retain the carbon and give out the oxygen. This has been long known; but it is only a recent discovery, that the *sole* source of woody fibre is the atmosphere.

Mould, or humus, can only arise from the decay of plants. No primitive mould can have existed; for plants must have preceded the mould, which this theory assumes as necessary to their existence. Whence, then, did the first vegetables derive their carbon, if not, as now, from the surrounding air? We shall arrive at satisfactory conclusions respecting the *mode* in which animal, as well as vegetable, life and nutrition are maintained, by observing how the uninterrupted uniformity of proportion is secured in the quantities of the elements composing the atmosphere. How does it happen that, with such an immense expenditure of oxygen as occurs in the combustion of countless millions of tons of coal, and in the consumption of that gas in the lungs of the myriads of creatures that live on the earth's surface, still the composition of the atmosphere is invariably the same?

The answer to this question depends upon another. What becomes of the carbonic acid which is produced by the breathing of animals, and in every instance where a combustible body is burnt? There is no change of volume: for the oxygen extracted from the atmosphere by a coal fire is replaced by the same bulk of carbonic acid, and similarly in every breath we draw. The immense masses of carbonic acid which flow into the atmosphere from so many causes ought perceptibly, after 6000 years old, to increase its quantity.

A *cause* must exist which prevents the increase of carbonic acid, by removing that which is continually forming; and there must be some means of replacing the oxygen which is removed from the air by combustion, breathing, and putrefaction.

Both these causes are united and displayed in the process of vegetable as well as of animal life. The facts we have already stated prove that the woody fibre, or carbon of plants, must be derived *exclusively* from the atmosphere. Now, carbon exists in the air only in the form of carbonic acid, and, therefore, in a state of combination with oxygen.

Besides, as already stated, carbon and the elements of water form the *principal* constituents of vegetables. Now, the proportion of oxygen in the whole mass of a plant is less than in carbonic acid. It is, therefore, certain that plants must possess the power of *decomposing* carbonic acid, since they appropriate the carbon for their own use. The formation of woody fibre, gum, starch, and the various substances containing carbon—that taken together compose a plant—must necessarily be attended with the *separation* of the carbon of the carbonic acid in the air from the oxygen of that acid. This oxygen is *returned* to the atmosphere, as experiment and observation prove, though its *source* is only just understood. And the carbon enters into composition with water, or its elements in the plant. The atmosphere must thus receive a volume of oxygen for every volume of carbonic acid which has been abstracted from it and decomposed. The leaves and green parts of a plant emit an *equal* quantity of oxygen in exchange for the carbonic acid they absorb, and they will do this even when torn from the stem on which they were just growing. Each acre of land which produces eight hundred weight of carbon, (say woody fibre,) gives annually to the atmosphere about two thousand six hundred pounds of free oxygen gas; so that an acre of meadow, wood, or cultivated land, replaces, therefore, in the atmosphere as much oxygen as is exhausted by eight hundred weight of carbon, either in its ordinary destruction by burning, or in the action of the lungs of animals.

Plants not only separate all noxious matters from the air,—they form, by this arrangement, an inexhaustible source of pure oxygen to supply that loss the air is constantly sustaining. Animals, on the other hand, throw off carbon from their lungs, which plants take in by their leaves; and thus the composition, or the relative proportions of the elements forming that medium in which they both exist, is maintained constantly unchanged.

Many conditions are necessary for the life and growth of plants. Each kind requires special conditions; and should but one of these be wanting, although all the rest be supplied, the plants will not be brought to maturity. It is in vegetable as in animal life: a mother crams her child exclusively with arrow-root; it becomes fat, it is true; but alas! it is rickety, and gets its teeth very slowly and with difficulty. Mamma is ignorant, or never thinks that her offspring cannot make bone, or, what is the same thing, phosphate of lime, the principal bulk of bone, out of starch. It does its best; and were it not for a little milk and bread, perhaps now and then a little meat and soup, it would have no bones and no teeth at all. Farmers keep *poultry;* and what is true of fowls, is true of a cabbage, a turnip, or an ear of wheat. If we mix with the food of fowls a sufficient quantity of egg-shells, or chalk, which they eat greedily, they will lay many more eggs than before. A well-fed fowl is disposed to lay a vast number of eggs; but cannot do so without the materials for the shells, however nourishing in other respects her food may be. A fowl, with the best will in the world, not finding any lime in the soil, nor mortar from walls, nor calcareous matter in her food, is incapacitated from laying any eggs at all. Let farmers lay such facts as these, which are matter of common observation, to heart, and transfer the analogy, as they justly may do, to the habits of plants, which are as truly alive, and answer as closely to evil or judicious treatment as their own horses. The organs of plants, like those of animals, contain substances of the most different kinds. Some are formed solely of carbon and the elements of water: as, for instance, woody fibre, resin, gum, and starch; some contain nitrogen: as, for instance, the gluten of wheat; and in all plants we find metals in a state of combination with oxygen. The food which can serve for the production or increase of *any*, or of all the organs of a plant, must necessarily contain the elements of that part, or set of parts. Dogs die although fed with jelly, which contains nitrogen in abundance: they cannot live upon white bread, sugar, or starch, if these are given as food, to the exclusion of other substances. Can it be concluded from this, that these things contain no elements suited for nutrition? Certainly not.

Because a vegetable is alive, it has the power of constantly reproducing itself; for this it requires a supply of substances which contain the constituent elements of its own substance, and which are susceptible of undergoing the necessary transformation. All the organs together, whether of animal or vegetable life, have not the power to *generate*, that is, to produce out of nothing a single element. A dog would die in the vacuum of an air-pump, even though supplied with a superabundance of food; it will die in the air if no food be given to it; it will die in oxygen gas, however freely it may be supplied with nourishment. But it is not hence to be concluded, that neither flesh, nor air, nor oxygen, is fitted to support life. They are all admirably calculated to do so; so it is just as reasonable to expect to bring a plant to perfection,—wheat, for instance,—which, in its healthy and natural state, contains silica, or potash, if it be planted in a soil destitute of such inorganic materials, or to which they have not been added. When we are acquainted with the nature of a single cubic inch of that soil, and know the composition of air and rain-water, we are in possession of all the conditions necessary to their life. The source of the different elements entering into the composition of plants, cannot possibly escape us, if we know *in what form* they take up their nourishment, and compare its composition with that of the vegetable substances which compose their structure.

Vegetables undergo, after death, two processes of decomposition: one of these is *fermentation*, the other is *putrefaction*. Decaying leaves, stalks, or roots, are, in fact, undergoing a slow process, analogous to combustion; inasmuch as it is the combination of the *combustible* parts of a plant, (structures that will burn,) with the oxygen of the atmosphere.

The decay of woody fibre (the principal constituent of all plants) is accompanied by appearances of a peculiar kind. This substance, in contact with air or oxygen gas, and no longer preserved from chemical decomposition by the living principle which has now left it, unites with that gas, and the product is an equal volume of carbonic acid. The property which woody fibre in a state of decay has to form carbonic acid with the surrounding oxygen of the atmosphere, diminishes as the decay advances, till it is complete, and ceases. Mould constitutes the principal part of brown coal and peat. An atmosphere of carbonic acid, formed at the expense of the oxygen of the air, surrounds every particle of decaying vegetable matter; hence the value of ploughing, digging, and otherwise loosening the soil: it permits the access of air. An atmosphere of carbonic acid is therefore contained in every fertile soil, and is the first and most important food for the young plants before they reach the surface. The leaves of trees which fall in the forest in autumn, and old roots of grass in a meadow, are converted into what is termed humus by the same agency; but humus does not nourish plants directly, by being taken up in its unaltered state, but *by presenting a slow and lasting source of carbonic acid*, which is absorbed by the roots of plants, and forms their principal nutriment at a time when, being *destitute of leaves*, they cannot, as yet, extract food from the atmosphere: hence one reason of the value of ploughing, digging, and otherwise lightening the soil, by permitting the access of air, and consequently, of carbonic acid to the seeds and roots. Seeds should always be sown, so as to be fully exposed to the influence of the air; and one cause of the unproductiveness of cold, clayey, adhesive soils is, that the seed is coated with matter which the air cannot get at. In sandy soils, the earth is mostly sufficiently penetrable by the atmosphere; but in clayey soils, there can scarcely be too great a mechanical tearing up and division, in the process of tillage. Many ploughmen know the fact, without knowing the reason of it: however, any seed not fully supplied with air, always produces a weak and diseased plant. In this way, then, we see the true uses of the vegetable decaying mould, when well torn up by the plough. The roots perform the after-functions of the leaves: they extract from the soil the carbonic acid generated from the humus, or vegetable mould; they decompose that acid, and absorb the carbon. When a plant is quite matured, and when the organs by which it obtains food from the air are fully formed, the carbonic acid of the soil is no longer required.

If turnips be sown in a soil capable of yielding as much nourishment as they will take up, they will attain a much larger size than under the reverse circumstances. *The size of a plant is always proportioned to the* SURFACE *of the organs which are destined to convey food to it.* A plant gains another mouth and stomach with every new fibre of root, and every new leaf.

Let us suppose a plant fully grown. All the necessary amount of woody fibre has been formed by the leaves. But the action of the leaf does not cease. Carbon is still absorbed; the expenditure of nutriment, the supply of which continues the same, takes a new direction. The leaves now produce sugar, starch, gum, or acids, which were previously formed by the roots when these substances were necessary for the development of the stem, buds, leaves, and branches of the rising plant. The direction of the nutriment again changes, and *blossoms* are produced. The functions of most plants cease upon the ripening of their fruit, because the products of their action are no longer needed. They now yield to the chemical influence of the oxygen of the air: their feeble vitality weakly opposes the decomposition which awaits all dead matter; they change color, fall off, and become converted into the mould of which we have been speaking.

A cubic inch of sulphuretted hydrogen gas introduced into the human lungs would cause instant death; but it is often formed, under a variety of circumstances, in the bowels without injurious effects.—Each organ, whether of an animal or a vegetable, extracts from the food presented to it what it requires for its own action and sustenance; while the remaining absorbed matters, which are not nutritive, combine together, and are separated as excrement. The excrementitious matters of one organ come in contact with another during their passage through the plant or animal, and, in consequence, suffer *new transformations:* the useless matters rejected by one organ contain the elements for the nourishment of another, till what is utterly useless is expelled from the system, by contrivances for that purpose. So the kidneys, liver, and lungs, are organs of excretion: the first separate from the body substances in which a large proportion of *nitrogen* is contained; the second those with an excess of *carbon;* and the third, such as are composed, principally, of more *oxygen* and *hydrogen* than is wanted. All superabundant *nitrogen* is thrown out from the body as a LIQUID excrement through the urinary passages; all *solid* substances, incapable of further useful transformation, pass out by the intestinal canal; and all *gaseous* matters by the lungs.

The presence of life prevents common chemical decomposition or putrefaction: the power to effect the transformations essential to nutrition and growth does not belong to it. Each such transformation is owing to a disturbance in the attraction of the elements of a given compound, and is, consequently, a purely *chemical* process. Similar changes of existing compounds are in constant progress during the whole life of a plant; in consequence of which there are produced gaseous matters, thrown off by the leaves and blossoms, solid excrements deposited in the bark, and fluid soluble substances which are excreted by the roots. Through the expulsion of these matters unfitted for nutrition, the soil receives back again the greatest part of the carbon, which it had at first yielded to the young plants as food in the shape of carbonic acid, from the decaying mould.

Having disposed of the question as to the origin of *carbon* in plants, and examined the relation between vegetable mould and the springing vegetable, we must next trace the source of the *hydrogen* and *nitrogen* they contain.

All the *hydrogen* necessary for the formation of a plant or animal is supplied by the decomposition of water. From their generating wax, fats, and volatile oils, containing hydrogen in large quantity, and no oxygen, we may be certain that plants possess the property of decomposing water; because from no other body with which they are placed in contact, could they obtain the hydrogen which exists as an *element* in those matters. *The process of vegetable growth, in its simplest form, consists in the extraction of hydrogen from water, and carbon from carbonic acid.* The green resinous principle of the leaf diminishes in quantity while oxygen is absorbed. We can explain, in a similar manner, the formation of all the component sub-substances of plants which contain no nitrogen. During the progress of growth, plants appropriate *carbon* from the carbonic acid found in the air, and *hydrogen* from the decomposition of water; the *oxygen* of which fluid is set at liberty, together with a part, or all of that contained in the carbonic acid. Decay, then, or vegetable putrefaction, is that great operation of Nature by which that oxygen which was consumed by plants during life is again returned to the atmosphere; for water is essential to such putrefaction.

As to the origin of nitrogen in plants, we may observe, that it exists in every part of the vegetable structure. No plant would attain maturity, even in the richest vegetable mould, unless *nitrogen* were supplied to it. How, it may be asked then, and in what form, does Nature furnish nitrogen to assist in the formation of vegetable albumen and gluten, to fruits and seeds?

This question is susceptible of a very simple solution. Plants, as we know, grow perfectly well in pure charcoal, if supplied at the same time—not with river or spring, or perfectly pure water, but with *rain*-water. Now, rain-water can contain nitrogen only in two forms—either as dissolved atmospheric air, (which, of course, contains nitrogen,) or as AMMONIA, of which nitrogen is *one* element.—We have observed, in speaking of the composition of water, that *rain*-water is found to contain ammonia; and this is the practical application of the fact. *Pure* air may, for our present purpose, be considered as oxygen and nitrogen in certain unalterable proportions, in a state of mixture; the carbonic acid and ammonia which float in the atmosphere may be regarded as *accidental* ingredients. If we were to suppose that plants derived their nitrogen directly from the atmosphere,—that is, by depriving the air of a portion of that nitrogen which is essential to its constitution—we are met by many difficulties. Rain-water does not yield nitrogen from pure air, which it may hold in solution or suspension, but from *ammonia*, which, rising from putrefied animal remains, becomes readily dissolved in the first mass of watery vapor that may present itself. We have no reason to believe that the nitrogen of the air takes part in the processes of nutrition in plants and animals; on the contrary, we know that many vegetables emit, or give off the nitrogen which is absorbed by their roots. But, on the other hand, there are numerous facts, showing that the formation in plants of *substances* containing nitrogen, as gluten, for instance, in corn, takes place in proportion to the quantity of this element, which is conveyed TO THEIR ROOTS in the state of soluble salts of *ammonia*, derived from the putrefaction of animal matter.

All animal bodies, during their decay, yield the nitrogen, which they abundantly contain, to the atmosphere in the form of ammonia. A generation of a thousand millions of human beings is renewed every thirty years: countless millions of animals have, during that period, ceased to live. Where, but floating in the atmosphere, is the nitrogen their bodies contained during life? *Without the occurrence of putridity and the generation of ammonia, and its diffusion in the air, the wheels of nature would soon stop—vegetable and animal life could go on no longer.* Ammonia is the simplest of all the compounds of nitrogen: the reader will remember our previous statement, that hydrogen and nitrogen combine to form ammonia. Hydrogen is that element for which nitrogen possesses the most powerful affinity.

The nitrogen, then, of putrefied animals is contained in the atmosphere (combined with hydrogen) as ammonia, in the form of a gas which is capable of entering into combination with carbonic acid, and of forming a volatile salt very soluble in water. Ammonia, therefore, cannot remain long in the air, as every shower of rain must dissolve it and convey it to the earth's surface, to be absorbed and decomposed by the roots of plants. We ought to expect, and such is the fact, that *rain*-water *must at all times* contain ammonia, though not always in equal quantity. If a pint of rain-water contain only a quarter of a grain of ammonia, then a field of forty thousand square feet must receive yearly upwards of eighty pounds of ammonia, or sixty-five pounds of nitrogen; for it is ascertained that the annual fall of rain-water over this extent of surface is at least 2,500,000 pounds. This is much more nitrogen than is contained in the form of vegetable albumen and gluten in 2650 pounds of wood, 2800 pounds of hay, or 200 cwt. of beet-root, which would be the yearly produce of such a field; but it is *less* than the straw, roots, and grain of corn which *might* grow on the same surface would contain. Animal manure, as we shall presently show, acts only by the formation of ammonia. Its employment in the cultivation of grain, and of fodder for cattle, furnishes convincing proof that the nitrogen of vegetables is derived from ammonia. The quantity of gluten in wheat, rye, and barley, is very different; and they contain nitrogen in varying proportions. Even in samples of the same seed the quantity varies; and why? Evidently because one variety has been better fed with its own appropriate fertilizer, than another which has been reared on a soil less accurately adapted by artificial means for its growth. French wheat contains 12 per cent. of gluten; Bavarian 24 per cent. Sir H. Davy obtained 19 per cent. from winter, and 24 from summer wheat; from Sicilian 21, from Barbary wheat 19 per cent. SUCH GREAT DIFFERENCES MUST BE OWING TO SOME CAUSE, AND THIS WE FIND IN THE DIFFERENT METHODS OF CULTIVATION. An increase of animal manure gives rise not only to an increase in the *number* of seeds, but also to a remarkable difference in the proportion of gluten which those seeds contain. Among manures of animal origin there is great diversity. Cow dung contains but a small proportion of nitrogen. One hundred parts of wheat, grown on a soil to which this material was applied, afforded only 11 parts of gluten, and 64 of starch; while the same quantity of wheat, grown on a soil fertilised with *human urine*, yielded 35 per cent. of gluten, and of course a smaller proportion of less valuable ingredients. During the putrefaction of urine, ammoniacal salts are formed in large quantity, it may be said, exclusively: for under the influence of warmth and moisture, urea, the most prominent ingredient of urine, is converted into carbonate of ammonia. Putrid urine is employed in Flanders as a manure with the best results. The barren soil on the coast of Peru is rendered fertile by means of a manure called Guano, which is collected from several islands in the South Sea. It forms a layer several feet in thickness upon the surface of these islands, and consists of the putrid excrements of innumerable sea-fowl that remain on them during the breeding season. This substance has recently been imported in large quantities into England; and its fertilising powers are very extraordinary. Its price, about £18 per ton, is a serious objection; and since the nitrogen it contains forms its principal recommendation, doubtlessly other matters nearer home will not be wasted, or their value unknown and disregarded, as to a great extent they have been. As to the practical results of the application of Guano, an intelligent agriculturist in the neighborhood of Hamburg has forwarded the annexed remarks to the Editor of the *Gardener's Chronicle*. He observes that "Most of the experiments with guano in the vicinity of this city have been made on meadows and lawns. On these it has produced the best possible effects; so that, for instance, at Flottbeck, the patches manured with guano presented not only a finer and darker green, but the grass was closer and more rich; so that comparing it with patches not guanized, the produce of the former may, without exaggeration, be stated to be double. To give an idea of the extraordinary forcing qualities of guano, we may mention that at Flottbeck, on a spot of grass managed after the English fashion, the second cutting of the grass was necessarily five days after the first, while the grass growing close by, (which had not been guanized,) although healthy and vigorous, required double the time to arrive at the same state of progress. It deserves to be stated as something remakable, that on the guanized spot, the dew appeared in the morning much stronger on the tops of the leaves, than on the part unguanized. In an experiment made by M. Staudinger on a barren hill, composed of granite or quartz, the guanized spot exhibited a dark bluish green sward, while round about nothing but barrenness was to be seen. If, therefore, a land owner wishes to cover bleak hungry pasture in a short time with nutritious grass for cattle or sheep, the guano certainly is the thing to do it. It would not only produce a plentiful fodder in the autumn, where cattle can be well nourished and prepared for the winter, but such guanized pasture will bring a heavy crop early in the spring.—Guano has also been used advantageously on a sour meadow overgrown with horsetails; and it produced, instead of reeds and bullrushes, a dense turf of sweet grass, and the horsetail almost disappeared. Thus, in the first place, more grass is obtained, which may be put down as double the former crops; and then the grass is very much improved in quality. Of course good drainage must be attended to on each meadow, if the result is expected to be complete. In using guano we must be careful to pulverise it well; because, on account of its tenacity, it will form into lumps, and on places where it lies too thick, it will burn the grass, although, subsequently, even on such places a luxuriant herbage will spring up. Experiments with guano on spring crops have been as successful at Flottbeck, with both wheat and rye, as on the above meadow. The wheat manured in the spring with guano is much superior to that manured in the ordinary way, both in grain and straw.

The following experiment was tried on a spot of almost blowing sand:—'On the 18th March, several square rods in the above locality, planted with winter rye, were strewed with guano. The spot thus manured was in a short time not only conspicuous for its dark green color, but the tiller became so luxuriant as to cover the whole surface. Notwithstanding a drought of two months, the guanized crops remained in the same flourishing condition; whilst the other rye standing close by had a weak and sickly appearance. Subsequently the former attained the height of five or six feet, with ears five inches long, with strong plump grain; whilst the latter were scarcely half that height in straw, and their ears were barren and empty.' This experiment speaks in favor of guano in preference to other manure in another respect. If a light sandy soil like the above is manured too much with common dung, and if there follows a luxuriant vegetation, with dark green foliage, we may be sure that, if there be subsequently any long drought, or sudden change of temperature from great heat to intense cold, rust will follow as a matter of course; whilst, in the above experiment, notwithstanding a nine-weeks' drought, and some intervening night frosts, the growth of the guanized rye was uniformly good up to the ripening of grain—a sufficient proof that the guano must possess the property of attracting and retaining the fine vapor contained in the air. Hence the fact is to be explained why dew was more apparent on the guanized turf than on that not subjected to that process. As we know that, in general, during long drought, the action of dung—in fact of every manure—ceases; and as it is light sandy soil which first suffers from drought, it must be evident what valuable manure guano is, not only on pastures, but for winter rye, our chief crop on light land. If an acre of land is dressed with 125 lbs. of guano, an abundant crop of grain and straw will fully repay the expenses incurred. If such a rye-field is laid down in spring with meadow catstail grass *(Phleum pratense)* and white clover, a heavy grass crop in the autumn would still increase the advantages already mentioned. As rape can by no means be too luxuriant, guano would produce an extraordinary result on it."

If a soil consist only of sand and clay, and be deficient of organic matter or the decaying remnants of animal or vegetable life, it is sufficient, and chemically correct, to add to it guano, in order to ensure a plentiful crop. Guano consists of ammonia in separate combination with uric, phosphoric, oxalic, and carbonic acids, together with a few earthy salts and some impurities. If guano be the fertiliser employed, it is valuable, chiefly from the ammonia it contains, and ammonia is valuable because one of its elements is nitrogen, which is yielded to the plants. Ammonia assists not only in the formation of gluten in wheat, but also in the production of vegetable albumen, one of the principal constituents of plants, and it is ammonia which forms the red and blue coloring of flowers. Nitrates, that is, earthy or metallic substances, combined with nitric acid, (which nitric acid is itself a compound of nitrogen and oxygen,) are necessary constituents of several plants which thrive only when ammonia is present,—hence the value of nitrate of soda. The influence of the direct rays of the sun is to effect the disengagement of oxygen from the stem and leaves of plants, (as previously stated,) which oxygen, seizing upon the nitrogen contained in ammoniacal matters, forms nitric acid, found in union with certain bases in many vegetables. In this way ammonia, by its transformation, furnishes nitric acid to the tobacco plant, that is, if it be found growing in a soil completely free from nitre or saltpetre, which is not nitrate of soda, but, in chemical language, nitrate of potass. The urine of men and of animals living upon flesh contains a large quantity of nitrogen, partly in the form of phosphates, partly as *urea*, a substance naturally peculiar to urine. Urea is transformed by the putrefactive process into carbonate of ammonia; that is to say, it takes the form of the identical salt which is always present in rain-water. *Human urine is the most powerful manure for all vegetables which contain nitrogen; that of horses and horned cattle contains less of this element, but infinitely more than the solid excrements of these animals.*

In the face of such facts as these, is it not pitiable to observe how the urine of the stable or cowshed is often permitted to run off, to sink uselessly into the earth, or to form a pool in the middle of a farm-yard, from which, as it putrefies, the ammonia formed in it is rapidly and completely escaping into the atmosphere, to be of as great utility in that volatile form to a neighbor's acres as to those nearer home?

It should be the care of the farmer so to employ all the substances containing nitrogen which his farm affords in the shape of animal excrements, that they shall serve as nutriment to his own fields. This will not be the case unless they are properly preserved and distributed over the soil. A heap of manure lying unemployed would serve him no more than other people, if the nitrogen it contains be allowed to form ammonia, by combining with hydrogen. All animal matters emit carbonic acid ammonia as long as any nitrogen remains in them. The residue is a nearly worthless carbonaceous mass. All animal excrements emit carbonic acid and ammonia as long as nitrogen exists in them. In every stage of their putrefaction an escape of ammonia from them may be induced by moistening them with pearl-ashes dissolved in water, the ammonia being apparent to the senses by its pungent effect on the nostrils. This ammonia evolved from manure is imbibed by the soil either in solution in water, or in the form of gas; and thus it is that plants may artificially be made to receive a larger supply of nitrogen than is naturally afforded to them by the surrounding atmosphere. Cultivated plants receive, of course, the same quantity of nitrogen from the air as trees, shrubs, and wild plants; but this, of course, is not enough for the purposes of agriculture; cabbages, wheat, potatoes, and apples being very different things in their wild, or, more properly, their *natural* state. The object of forest culture is, the production of carbon or woody fibre; of garden or field culture, chiefly the addition of as much nitrogen as the plant can be made to take up.

The solid excrements of animals do not contain as much nitrogen as those which are voided in a liquid form; and, for this reason, do not constitute so powerful a fertilising material. This could not be otherwise. The *quantity* of food which animals take, diminishes or increases in proportion as it contains more or less of the substances containing nitrogen. The bowels of the cow are *relatively* much longer than those of the tiger; the *bulk* of food consumed by the former animal is greater, and it requires to be retained longer, to traverse a greater extent of surface, before it can yield all its nutriment, than occurs in animals feeding on flesh, which contains so much nitrogen. A horse may be kept alive upon potatoes, which contain very little nitrogen; but life thus supported is gradual starvation. So the *quantity* of rice which an inhabitant of the East Indies will eat astonishes an Englishman; but the fact that rice contains *less* nitrogen than any other kind of grain, at once explains the circumstance. In hot countries human beings live sparingly on vegetables which contain little of this principle; in very cold countries human beings require very fat substances, in order to support existence, and to enable them to generate as much animal heat as is necessary. The Esquimaux will devour amazing quantities of whale's blubber, and would speedily die (in that climate) without a free supply of food containing large quantities of nitrogen. Hence, vegetation is scanty—for food it is scarcely necessary: they live upon fish or animals caught in the chase. In tropical climates, on the contrary, where animal food is not so necessary, a luxuriant vegetation is provided to satisfy the natural wants of man.

By means of manure an *addition* only is made to the nourishment supplied from the air; for the excrements of all animals contain less nitrogen than their food, and consequently a smaller quantity of matter containing nitrogen is given to the soil than has been abstracted in the form of grass, hay or seeds.

Another reason why liquid excrements containing ammonia (or that which, by further spontaneous chemical action yields ammonia, and consequently nitrogen) are more useful than solid excrements, is to be found in the fact, that the former contain the greatest part of their ammonia *in the state of salts:* in a form, therefore, in which *it has lost its volatility* when presented in this condition, not the smallest *quantity of ammonia*, in such a shape, *is lost to the plants*,—it is all dissolved by water and *imbibed by their roots.* Practical farmers see the results: they know that plaster of Paris or gypsum, the insoluble sulphate of lime, strikingly increases the luxuriance of meadow grass upon which it is strewed. But why? Because it fixes in the soil all the ammonia of the atmosphere, which would otherwise be *partially* volatilised with the water that constantly evaporates from the surface of the soil. The sulphuric acid of the sulphate of lime has a stronger affinity for ammonia than it has for lime; so *sulphate* of ammonia is formed, which is not volatile, and does not escape into a neighbor's pastures. In such an instance, the carbonate of ammonia *naturally* contained in rainwater is decomposed by the gypsum, in precisely the same manner as occurs in the manufacture of sal-ammoniac. Soluble (but not volatile) sulphate of ammonia, and carbonate of lime or chalk, are formed by double decomposition; so that the beneficial effects of gypsum as a manure are not direct, but indirect, by *fixing* the ammonia either of rain-water or of manure with which it may have been mixed, and thus presenting that ammonia, or its valuable element nitrogen, to the roots of plants in a form susceptible of absorption. All the gypsum gradually disappears, but its action upon the carbonate of ammonia continues as long as a trace of it exists.

It is quite evident, therefore, that science alone can truly explain the mode in which certain matters exert their beneficial agency; and consequently science alone can *rationally* direct the practical farmer. All else beside is mere experiment,—hazardous, expensive, and conjectural.

In order to form an idea of the effect of gypsum, it may be sufficient to remark, that 100 pounds of burnt gypsum *fixes* as much ammonia in the soil as 6250 pounds of horses' urine would yield to it. The decomposition of gypsum does not take place instantaneously; it proceeds very gradually, and this explains why the action of gypsum lasts for several years; the supply of ammonia from the air, of course, remaining steady and unfailing.

All rust of iron (or iron in combination with oxygen) contains a certain quantity of ammonia: the advantage of manuring fields with burned clay depends upon the presence of oxide of iron. Now, all minerals containing alumina, or oxide of iron, possess, in a remarkable degree, the property of attracting ammonia from the atmosphere, and of retaining it in the soil. Pipe-clay, (which is aluminous earth,) when moistened with a solution of caustic potash, emits ammonia, which it has absorbed from the atmosphere. Soils, therefore, containing oxides of iron, and burnt clay, must absorb ammonia, which is separated by every shower of rain, and conveyed, in a dissolved state, to the roots of vegetables. Charcoal possesses a similar action; it will absorb ninety times its volume of ammoniacal gas, which may again be separated simply by moistening it with water, in which ammonia is extremely soluble. This explains why plants will grow in pure charcoal moistened with RAIN-water. We have here another easy and satisfactory method of explaining still further the properties of humus, or of wood in a decaying state. Decayed oak-wood absorbs 72 times its weight of ammonia; humus, then, is not only a slow and constant source of carbonic acid, (repairing the loss of that which is constantly decomposed and absorbed by the leaves of vegetables, as before stated,) but it is a means by which the necessary nitrogen is *mechanically* conveyed to plants.

No conclusion can have a better foundation than this, that it is the ammonia of the atmosphere which furnishes all the nitrogen to plants they receive while uncultivated. All the innumerable products of vitality resume, after death, the original form from which they sprung; and thus death, the complete dissolution of an existing generation of animals and plants, becomes the source of life for a new one, and of that *artificial* and *forced* amount of nutriment which plants may be *compelled* to receive, if *judiciously* fed, or, in other words, manured.

CHAPTER VI.

Of the Sources of the Saline, Earthy, and other Unorganized Constituents of Vegetables.

A further question arises: Are the conditions already considered all that is necessary for the life and growth of plants? It will now be shown that they are not.

Carbonic acid, water, and ammonia, are necessary for the existence of vegetation, because they contain the *elements* from which their organs are formed; but other substances are requisite (as silica in straw) for the formation of certain organs destined for special functions peculiar to each family of plants. Plants obtain these substances from inorganic nature. In the ashes of burnt vegetables the same substances are found, although in an altered condition. Many of these inorganic constituents vary according to the soil in which the plants grow; but without a certain number of them, according to the nature of such plant, they never arrive at maturity. All substances that water will dissolve in a soil are absorbed by the roots of plants exactly as a sponge imbibes a liquid indiscriminately. The substances thus conveyed to plants, are either retained in greater or less quantity, or are entirely separated when not suited for nutritive purposes.

Phosphate of magnesia, in combination with ammonia, is an invariable constituent of the *seeds* of all kinds of grasses. It is contained in the outer husk, and is introduced into bread, along with the flour, as part of the bran. When ammonia is mixed with beer, this salt is precipitated.

Most plants contain ACIDS of very different composition and properties, all of which are in combination with bases, such as potash, soda, lime, or magnesia. These bases evidently regulate the formation of the acids; for example, the quantity of potash contained in the juice of the grape is less when it is ripe than when unripe; and the acids, under the same circumstance, are found to vary in a similar manner. We glanced, in a former section, at the *existence* of inorganic acids and bases in vegetables: we have now to investigate their *source*.

The *acids* found in the different families of plants are very various. It cannot be supposed their presence and peculiarities are the result of chance or accident. They must serve some end in vegetable life, independently of their utility to the animals for whose healthful use some, if not all, of them are ultimately destined. Acids constantly exist in vegetables; and it is incontestable that they are necessary to their life. And it is equally certain that some alkaline, earthy, or metallic base, is also indispensable, in order to enter into combination with such acids which are always found in the state of salts, as oxalate of potash in the sour-leaf or sorrel.

The nature of a soil exercises a decided influence on the quantity of the different metallic oxides contained in the plants which grow on it. It is not known *in what form* silica, manganese, and oxide of iron, are contained in vegetables ; but we know that potash, soda, and magnesia, can be extracted from *all* parts of their structure, in the form of salts of organic acids. As these acids and bases are never absent from plants, and as even the form in which they present themselves is subject to no deviation, it may be affirmed that they are necessary, as exercising an important influence over the development of fruits and seeds, and also on many other functions, of the nature of which we are at present ignorant. The *perfect* development of a plant is dependent, then, on the presence of alkalies, or alkaline earths ; when these substances are totally wanting, its growth will be stopped ; when they are only deficient, it must be correspondingly impeded. Firs and pines find a sufficient quantity of alkalies in barren, sandy soil ; and wheat thrives in another kind of soil : because the bases necessary to bring each to maturity exist there in sufficient quantity. The proportion of silicate of potash (necessary for the firmness of wheat straw) does not vary perceptibly in the soil of corn-fields, because what is removed by the reaper, is again replaced in putrefying straw. But this is not the case with meadow-land. Hence we never find a luxuriant crop of grass on sandy and limestone soils which contain little potash, evidently because one of the constituents indispensable to the growth of the plants is wanting. If a meadow be well manured, we remove, with the increased crop of grass, a greater quantity of potash than can, by a repetition of the same manure, be restored to it. So, grass-land manured with gypsum soon ceases to feel its agency. But if the meadow be strewed from time to time with wood ashes, or soap-boilers' ley made from wood ashes, then the grass thrives as luxuriantly as before. And why ? The ashes are only a means of restoring the necessary potash for the grass stalks. So oats, barley, and rye, may be made for once to grow upon a sandy heath, by mixing with the scanty soil the ashes of the heath-plants that grow upon it. Those ashes contain soda and potash, conveyed to the growing furze or gorse by rain-water. The soil of one district consists of sandstone ; certain trees find in it a quantity of alkaline earths sufficient for their own sustenance. When felled, and burnt, and sprinkled upon the soil, oats will grow and thrive that without such aid would not vegetate.

The most decisive proof of the absurdity of the indiscriminate use of any strong manure was obtained at Bingen, a town on the Rhine, where the produce and development of vines were highly increased by manuring them with animal matters, such as shavings of horn. After some years, the formation of the wood and leaves decreased perceptibly. Such manure had too much hastened the growth of the vines : in two or three years they had exhausted the potash in the formation of their fruit, leaves and wood ; so that none remained for the future crops, as shavings of horn contain no potash.

Cow-dung would have been better, and is known to be better. A knowledge of chemistry furnishes the reason, which is found in the fact, that it contains a large proportion of potash, though very little nitrogen. Hence, if nitrogen be the element in demand, cow-dung is *not* the material that will yield it. All the potash contained in the food consumed by a cow, is again immediately discharged in its excrements.

A landed proprietor, in order to obtain more potash for his soil, planted it with wormwood, the ashes of which are well known to contain a large quantity of that alkali. The consequence was, that he rendered his land quite incapable of bearing grain for many years. He had entirely deprived the soil of its potash. Had he sown wheat upon it instead of wormwood, he would have found the soil contained as much potash as was necessary for the nutrition of *that* vegetable. The supposition that alkalies, metallic oxides, or inorganic matter in general, are *produced* by plants, is refuted by such facts as these: they are *absorbed* by plants, not *generated.*

Those grasses, the seeds of which furnish food for man, follow him like the domestic animals. Saline plants require common salt, and seek the sea-shore. The plants which grow on dung-hills need ammonia and the nitrates, and are attracted whither these can be found, just as the dung-fly is to animal excrements. So, likewise, none of our corn plants can bear plump seeds, yielding good and plentiful flour, without a large supply of phosphate of magnesia and ammonia, substances which they require for their maturity. No soil is richer in them than those where men and animals dwell together. Where the urine and excrements of these are found, corn plants appear; because their seeds cannot attain maturity unless supplied with the constituents of these matters.

During the boiling or evaporation of saltpetre ley, the salt volatilises with the water, causing a loss which otherwise could not be explained. In sea storms, leaves, in the direction of the wind, are covered with crystals of salt, twenty or thirty miles from the sea. The great storm which occurred in England a few winters ago, verifies this statement. But it does not require a storm to cause the volatilisation of the salt: every breeze must carry it away. The sea-air is always sufficient to make a solution of nitrate of silver turbid and milky. Now, as millions of tons of sea-water annually evaporate into the atmosphere, a corresponding quantity of the saline matters dissolved in it, common salt, muriate of potash, muriate of magnesia, and other matters, will be conveyed by the wind to the land. This volatilisation is a source of considerable loss in salt-works where the quantity of salt in the liquor is not large.

According to Marcel, sea-water contains in every 1000 parts 26 of common salt, 4 of sulphate of soda, or glauber salt, 1½ of muriate of potash, 5¼ muriate of magnesia, and 1½ of sulphate of lime or gypsum. If it be asked, whether there be any peculiarities in the mode of existence of sea-plants and fish, we know that ammonia is found in sea-water; and that, while *air* contains only from four to six ten-thousandth parts of its volume of carbonic acid, *sea-water* contains 100 times more, or 620 parts in every ten thousand; so that the same conditions which sustain living beings on the land, are combined in the ocean, in which a separate world of other plants and animals exists.

By the continual evaporation of the sea, its salts are spread over the whole surface of the earth, subsequently to be carried down by the rain, and furnishing to vegetables, through the medium of the soil, those saline matters essential to their existence. The salts of potash, magnesia, and soda, are not peculiar to the ocean: they are found naturally existing on the land as in the water; but the above explanation accounts for the origin of alkalies in the ashes of plants in those cases where the soil could not have yielded them. Nor must we overlook the fact, that whatever be the nature of the soil, or however impoverished by successive crops of alkaline vegetables, upon that surface the distant ocean is for ever, unchangingly, and silently, pouring the saline treasures of the great deep. Were the proportions of land and ocean reversed as to their extent, it is easy to predict the effect upon vegetation; as it is, the existing quantity of saline material in the ocean (which could not be increased without detriment to its inhabitants) is amply sufficient for the more than single purpose that wise arrangement was destined to answer. The atmosphere contains only a thousandth part of its weight of carbonic acid; and yet, small as this proportion appears, it is quite sufficient to supply the whole of the present generation of living beings with carbon for a thousand years, even if it were not renewed. Navigators have sailed for hundreds of miles along the unbroken edge of a coral reef: the clustering islands of the Pacific are many of them exclusively of coraline origin. Sea-water contains one twelve-thousandth part of its weight of lime; and yet, from this apparently minute quantity, insect agency has raised those very reefs upon which many a huge ship has been dashed into shapeless fragments.

CHAPTER VII.

Of the necessary Relation between the Composition of a Soil and the Vegetables it is fitted to raise. Fallowing and Green Crops considered as Vegetable manure.

The methods employed in the cultivation of land are different in every country; and when we inquire the cause of these differences, we are told that they "depend upon circumstances." Now, as few people have endeavored to ascertain these circumstances, to reason correctly, and act from rational principle, no answer could show ignorance more plainly. So, when we inquire how manure acts, we are either met with a reply that is figurative and incorrect, or, with the admission that the result is all that is known or cared about. We are told that the excrements of man and animals, or, that certain mineral matters are supposed to contain an incomprehensible *something*, which assists in the nourishment of plants, and increases their size. No attempt is made to ascertain the component parts of the different species of manure, much less to ascertain whether it be precisely fitted to supply a known deficiency in the soil.

Besides heat, light, moisture, and the component elements of the atmosphere, which are necessary for the *mere existence* of all plants, certain fertilizing substances are seen to exercise a peculiar influence over the development either of whole plants, or of particular parts of them. Such substances are either already contained in the soil, or may be artificially supplied in the form of manure.

The rules of a rational system of agriculture should enable us, therefore, to give to each plant that which it requires for the attainment of the *special* object in view—namely, an *artificial increase of certain parts* which are employed as food for man and animals.

The means employed for the production of fine pliable *straw* for hats and bonnets is the *very opposite* to the mode which must be adopted, in order to produce the largest possible quantity of *corn* from the same plant. Peculiar methods must be used for the production of nitrogen in the seeds; others for giving strength to the straw; and others again, when we wish to give such qualities to the straw as will enable it to bear the weight of the ears.

We must proceed in the artificial rearing and forcing of plants precisely as we do in the fattening of animals. The flesh of wild animals is devoid of fat, or nearly so. The production of flesh and fat may be artificially increased: all domesticated animals are easily fattened. To do this, we add to the quantity of food, and lessen (as in the stall-fed ox) the waste occasioned by the increased action of the lungs, (as consequent upon motion,) together with the waste which such muscular exertion would produce by increased action of the skin.

Arable land is originally formed by the crumbling of rocks, and its properties depend on the nature of its component parts.

Sand, *clay*, and *lime*, are the names given to the principal constituents of the different kinds of soil.

Pure sand, and pure limestone, in which there are no other unorganized substances except the earth of flint, chalk, or silicic acid combined with lime, form absolutely barren soils. But clay always forms a part of fertile soils. Whence is the origin of clay earths in arable land? What are their constituents? and what part do they play in favoring vegetation? They are produced by the breaking down of *aluminous minerals* by the action of the weather. These minerals are found, mixed with other substances, in granite, mica-slate, porphyry, clay slate, the volcanic rocks, and others. Mountain limestone is remarkable for the quantity of clayey earths which it contains. In grauwacke we find pure quartz, clay slate, and lime; in the sandstones, quartz and loam; and in the transition limestone there is an intermixture of clay, felspar, and clay slate. These examples may be sufficient.

It is known that aluminous minerals (that is to say, minerals containing the metal "*aluminium*," which, combined with oxygen, forms "*alumina*," or the pure earth of clay) are the most widely diffused on the surface of the earth; and all *fertile* soils, or soils capable of culture, invariably contain alumina.

There must, therefore, be something in *aluminous earth* which causes it to exercise an influence on the life of plants, and to assist in their growth. The property on which this depends is, that *clay invariably contains potash and soda.* Besides which alumina attracts and retains water and ammonia from the atmosphere. Alumina is itself very rarely found in the ashes of plants; but silica (or the earth of flints) is always present, having in most places, entered the plants by means of alkalies. Among aluminous minerals, felspar, which is one of them, contains 17 per cent. of potash; mica from 3 to 5 per cent. of soda; clay slate contains from 2 to 3 per cent. of potash; and loam from 1½ to 4 per cent. of the same alkali.

So that, in a layer of soil formed by the breaking down of 40,000 square feet of one of these rocks, to the depth of 20 inches, we should find that so much felspar would contain more than a million pounds of potash; if the soil were formed by the disintegration of clay slate, about 200,000; if loam were the material, from 87,000 to 300,000; and similarly of other rocks of partially aluminous character.

Potash is present in all clays, and in marl; it has been found in all aluminous earths in which it has been sought. Alum (which is a sulphate of alumina, combined with sulphate of potash) may be procured by digesting clay in sulphuric acid, which takes up both the alumina and the potash.

A thousandth part of loam mixed with the quartz in red sandstone, or with the lime in the different limestone formations, affords as much potash to a soil twenty inches in depth as is sufficient to supply a forest of pines growing upon it with potash for a hundred years.

Water, impregnated with the carbonic acid of the atmosphere, decomposes rocks which contain alkalies, and then dissolves a part of the alkaline carbonates formed in the process. Plants also, by producing carbonic acid during their decay, and by means of the acids emitted by their living roots, contribute no less powerfully to destroy the coherence of solid minerals. Air, water, and changing temperature prepare the different species of rocks for yielding to plants the potash or soda they contain. Mrs. Ellis relates, that among the mountains which divide France from Spain, the rocks actually *smoke* after rain, under the influence of the summer sun, and become so hot that it is uncomfortable to sit down upon them. Changing temperature is a most important agent in nature. It not only assists in the *original formation* of soils, but exerts a most powerful influence over those already in existence. In *wet* soils the temperature rises slowly, and never attains the same height as in one that is sandy and dry. When the heat of the atmosphere rises no higher in the shade than 60 or 70 degrees, a *dry* soil may become so warm as to raise the thermometer to 90 or 100. Hence, though the expression be used figuratively, it is in this instance strictly correct to say that *wet* soils are *cold.*

The *exhaustion of alkalies* in a soil by successive crops is the true reason why practical farmers *suppose* themselves *compelled* to suffer land to lie fallow. It is the greatest possible mistake to think that the temporary diminution of fertility in a field is chiefly owing to the loss of the decaying vegetable matter it previously contained: it is principally the consequence of the exhaustion of potash and soda, which are restored by the slow process of the more complete disintegration of the materials of the soil. It is evident that the careful tilling of fallow land must accelerate and increase this further breaking up of its mineral ingredients. Nor is this repose of the soil always necessary. A field, which has become unfitted for a certain kind of produce, may not, *on that account*, be unsuitable for another; and upon this observation a system of agriculture has been gradually formed, the principal object of which is to obtain the greatest possible produce in a succession of years, with the least outlay for manure. Because plants require for their growth different constituents of soil, changing the crop from year to year will maintain the fertility of that soil (provided it be done with judgment) quite as well as leaving it at rest or fallow. In this we but imitate nature. The oak, after thriving for long generations on a particular spot, gradually sickens; its entire race dies out; other trees and shrubs succeed it, till, at length, the surface becomes so charged with an excess of dead vegetable matter, that the forest becomes a peat moss, or a surface upon which no large tree will grow. Generally long before this can occur, the operation of natural causes has gradually removed from the soil substances essential to the growth of oak, leaving others favorable and necessary to the growth of beech or pine. So, in practical farming, one crop in artificial rotation with others, extracts from the soil a certain quantity of necessary inorganic matters; a second carries off, in preference, those which the former had left, and neither could nor would take up.

Experience proves that *wheat* should not be attempted to be raised *after wheat* on the same soil; for, like tobacco, it *exhausts* the soil. But, if "humus," decaying vegetable matter, gives it the power of producing corn, how happens it that, in soils formed in large proportion of mouldered wood, the corn-stalk attains no strength, and droops permanently? The cause is this; the strength of the stalk is due to *silicate of potash,* and the corn requires *phosphate of magnesia;* neither of which substances a soil of decaying vegetable matter can afford, since it does not contain them: the plant may, indeed, under such circumstances, become an herb, but it will bear no seeds. We say phosphate of magnesia is necessary;—the small quantities of the phosphates found in peas and beans is the cause of their *comparatively* small value as articles of nourishment, since they surpass all other vegetable food in the quantity of *nitrogen* they contain. But as the component parts of bone, namely phosphate of lime and magnesia, are absent in beans and peas, they satisfy appetite without increasing the strength.

Again, how does it happen that wheat does not flourish on a sandy soil, and that a limestone soil is also unsuitable, unless mixed with a considerable quantity of clay? Evidently because these soils do not contain potash and soda, (always found in clay;) the growth of wheat being arrested by this circumstance, even should all other requisite substances be presented in abundance. It is because they are mutually prejudicial by appropriating the alkalies of the soil, that wormwood will not thrive where wheat has grown, nor wheat where wormwood has been.

One hundred parts of wheat straw yield 15½ of ashes; the same quantity of barley straw, 8½; of oat straw, only 4; the ashes of the three are, chemically, of the same composition. Upon the same field which will yield only one harvest of wheat, two successive crops of barley may be raised, and three of oats. We have, in these facts, a clear proof of what is abstracted from the soil, and, consequently, what plants require for their growth,—a key to the *rational* mode of supplying the deficiency.

Potash is not the *only* substance requisite for the existence of most plants; indeed it may be replaced, in some cases, by soda, magnesia, or lime; but other substances are required also.

Plants obtain *phosphoric* acid (found in combination with lime or magnesia) from the soil, and they, in their turn, yield it to animals, to assist in the formation of their bones. Creatures that feed upon flesh, bread, fruit, and husks of grain, take in much more phosphorus than is required for the building up of the animal fabric; and this excess is again usefully thrown out by them, chiefly in their liquid excrements. Some plants, however, extract other matters from the soil besides *silica*, *potash*, and *phosphoric acid*, which are essential constituents of the plants ordinarily cultivated.

English farming presents us with varied instances of plants sown, and growing together in the same field. Two such vegetables will mutually injure each other, if they withdraw the same food from the soil. Plants will thrive beside each other, either when the substances necessary for their growth, extracted from the soil, are of different kinds, or when they themselves are not both in the same stage of growth at the same time. On a soil containing potash, wheat and tobacco may be reared in succession, because the latter plant does not require the phosphates which the wheat has appropriated to itself. Now, tobacco requires only alkalies, and food containing nitrogen. When we grow different plants in the same soil, for several years in succession, the first of which leaves behind that which the second, and the second that which the third may require, the soil will be a fruitful one for all the three kinds of produce. If the first plant, for example, be wheat, which consumes the greatest part of the silicate of potash in the soil, the plants which succeed it should be such as require little potash, as turnips or potatoes. The wheat lands may be sown again with wheat, advantageously, after the fourth year. The reason of this is, that during the interval of three years, the soil will, *by the action of the atmosphere*, be rendered capable of again yielding silicate of potash in sufficient quantity for wheat. Whether this process can be *artificially anticipated*, by supplying the exhausted ingredient to the soil, is a further, and most interesting inquiry.

In a four-years' course of cropping, the crops gathered amounted, per acre, to—

1st year, *Turnips*, 25 tons of bulbs, and 7 tons of tops.
2d year, *Barley*, 38 bushels, and a ton of straw.
3d year, *Clover* and *Rye Grass*, 1 ton of each in hay.
4th year, *Wheat*, 25 bushels, and 2 tons of straw.

Supposing none of the crops to be eaten upon the land, the quantity of *inorganic matter* contained in the above would be as follows:

	lbs.		lbs.	
Potash,	281	Silica,	318	
Soda,	130	Sulphuric acid,	111	in combination with the earths and alkalies;
Lime,	242	Phosphoric acid,	61	
Magnesia,	42	Chlorine,	39	
Alumina,	11			

making a gross weight of 1240 pounds, or about eleven hundred weight.

A still clearer idea of the importance and quantities of these inorganic matters, may be obtained by a consideration of the fact, that if we were to carry off the entire of the above produce, and return none of it again in the shape of manure, (supposing also that we could stop the beneficial agency of the atmosphere during that period,) we must, or ought, instead of that produce,—if the land is to be restored to its original condition,—add to each acre, every four years, 300 pounds of pearl ashes, or potash; 440 of carbonate of soda; 65 of common salt; 240 of quick lime; 250 of sulphate of magnesia, that is, Epsom salts; 84 of alum; and 260 of bone dust: making 1729 pounds of solid saline matter, at an expense of nearly £9. The fertility of a soil cannot remain long unimpaired, unless we replace in it all those substances of which it has been deprived. We could keep our fields in a constant state of fertility, by replacing, every year, as much as we remove from them in the form of produce; and, be it remembered, that our cultivated corn plants, and bulbous roots, are not like forest plants and trees: the quantity of nutriment they require, and take up, to bring them to perfection and perpetuate the race, is far more than the unaided elements around them could supply. Wheat, for instance, as a natural production of the soil, appears to have been a very small grass: and the case is still more remarkable with the apple and the plum. The common crab seems to have been the parent of all our apples. Potatoes and turnips, in their wild or natural state, are unfit for food; and two fruits can scarcely be conceived more different in color, size, and appearance, than the wild plum and the rich magnum bonum. We have to contend, then, with two important differences: *First*, That wheat or turnips are *not* natural productions; and, *secondly*, That because they are not, they drain or exhaust unassisted soil faster than the wild plants of the forest; nor will they thrive long, if denied that assistance from artificial nutriment, which nature cannot supply in sufficient quantity.

It is evident, then, that an *increase* of fertility, and consequent increase of crop, can only be expected when we add more to the soil of the *proper* material, *(and no other,)* than we take away. Any soil will partially regain itself by lying fallow: this is owing to atmospheric action, and the conversion of the roots and stalks into humus. But though the quantity of decaying vegetable humus in a soil may be increased to a certain degree by cultivation and alternate cropping, still there cannot be the smallest doubt, that a soil must (without help) ultimately lose those of its constituents, which are removed in the seeds, roots, and leaves of the plants raised upon it.

To prevent this loss, and, as a further object, to enable us to raise increased quantities of productions, demanding more sustenance than the land will naturally yield, is the object of the application of the various substances used as MANURES. They will prove useless, injurious, or valuable, precisely as they are accurately or inaccurately adapted to meet the deficiency.

Land, when not employed in raising food for animals or man, should, at least, be applied to the purpose of raising manure for itself; and this, *to a certain extent*, may be effected by means of GREEN CROPS, which, by their decomposition, not only add to the amount of vegetable mould contained in the soil, but *supply the alkalies that would be found in their ashes.* That the soil should become richer by this burial of a crop, than it was before the seed of that crop was sown, will be understood by recollecting that *three-fourths* of the whole organic matter we bury *has been derived from the air:* that by this process of ploughing in, the vegetable matter is more equally diffused through the whole soil, and therefore more easily and rapidly decomposed; and that by its gradual decomposition, ammonia and nitric acid are certainly generated, though not so largely as when animal matters are employed. He who neglects the green sods, and crops of weeds that flourish by his hedgerows and ditches, overlooks an important natural means of wealth. Left to themselves, they ripen their seeds, exhausting the soil, and sowing them annually in his fields: collected in compost heaps, they add materially to his yearly crops of corn. We have said that absolute repose of the soil is not frequently needed; and, with some practical illustrations of the system of alternate cropping, we will close this section.

In Flanders, two crops of clover are cut, and the third is ploughed in. In Sussex, turnip seed has been sown at the end of harvest, and, after two months, again ploughed in with great benefit to the land. So turnip leaves and potatoe tops decay rapidly, and are more enriching when buried in the green state. In the Earl of Leicester's course of cropping, the land is never idle. The turnip is the first in the order of succession. This crop is manured with recent dung, which immediately affords sufficient matter for its nourishment; the heat produced in its decomposition assisting in the extrication of ammonia, the liberation of nitrogen, and the consequent germination of the seed, and growth of the plant. Next after turnips, barley, with grass seeds, is sown; and the land having been little exhausted by the previous crop of turnips, affords the soluble parts of the decomposing tops and manure to the barley. The barley is gathered; the grasses, rye-grass and clover, remain, which derive a small part only of their organized matter from the soil, and probably consume the *gypsum* which would be useless to previous and succeeding crops. These grasses, by their large system of leaves, absorb mainly their nutriment from the atmosphere; and, when PLOUGHED IN *at the end of two years*, their decomposed roots and leaves are useful to the *wheat crop*, which is next, and last in succession. At this period of the course, the woody fibre of the farm-yard manure, containing phosphate of lime, is sufficiently decomposed; and as soon as the *most exhausting* crop is taken off the land, recent animal manure is again applied. Pease and beans, in all instances, seem well adapted to prepare the ground for wheat; and in some parts of the country they are raised, alternately with wheat, for years together. Mr. Gregg,—whose ingenious system of cultivation has been published by the Board of Agriculture, and who adopts, upon strong clays, a plan similar to that of the Earl of Leicester, (better known as Mr. Coke of Holkham,)—suffers the ground, after barley, to remain at rest for two years in grass; sows pease and beans on the leys; ploughs in the pea or bean stubble for wheat; and, in some instances, follows his wheat crops by a course of winter tares and winter barley, which is eaten off in the spring before the land is sown for turnips.

It is a great advantage, in the *convertible* system of cultivation, that the whole of the manure is employed as well as the entire resources of the land, in their proper order; those materials which are not fitted for one crop, remaining as nutriment, or essential requisites for the next, or for another.

CHAPTER VIII.

Of the Nature and correct Use of the Excrements of Animals considered as *Manure;* the Mode of its Action and Preservation.—Bone Dust, and dead Animal Matter.

CALICO printers for a long time have used the solid excrements of the cow in order to brighten and fasten colours on cotton cloth. This material appeared quite necessary, and its action was ascribed to some latent principle or material derivable from the living animal.

But since the action of cow-dung was known to depend on the *phosphates* contained in it, it has been completely replaced by a more cleanly mixture of certain salts, of which the most prominent is *phosphate of soda.*

So, similarly, in medicine, for many centuries the mode of action, or the active principle of all remedies, was veiled in obscurity. But now these principles have been presented to the world in an extremely active and concentrated form. The extraordinary efficacy of Peruvian bark in the cure of fever, is found to depend on the admixture of a minute quantity of a crystalline substance termed *quinine*, with the useless woody fibre; and the causes of the various effects of opium, in as many equally minute yet powerful ingredients in that drug. The inhabitants of Savoy are much infested with the disease known among us as "Derbyshire neck." They have springs which are famous for its cure; we derive benefit from the use of burnt sponge. Now, burnt sponge contains iodine; and upon examination these springs contain iodine in small quantities. The action of the sponge, or of the water, must depend upon some *definite cause* common to both; by ascertaining which we place the action and result completely at our command.

Apply this reasoning to agricultural operations. One practical farmer applies, indiscriminately, any fertilising material to his land in any state; another, more partial to what is technically termed "short muck," allows violent fermentation to reduce his mixture of straw and dung to one half its weight,—during which operation much gaseous ammonia is disengaged and lost, which, if retained, or supplied to the soil, would have proved extremely serviceable. Both methods cannot be right in all cases.

Besides the dissipation of gaseous matter when fermentation is pushed to the extreme, there is another disadvantage in the loss of *heat*, which, if excited in the soil instead of the dunghill, is useless in promoting the springing of the seed, and in assisting the plant in the first stage of its growth, when it is most feeble and most liable to disease: and the decomposition of manure in the soil must be particularly favorable to the wheat crop, in preserving a genial temperature beneath the surface late in autumn and during winter. These views are in accordance with a well-known principle in chemistry,—that, in all cases of decomposition, substances combine much more readily at the moment of their disengagement than after they have been some time perfectly formed and set at liberty. And in fermentation beneath the soil, the fluid matter produced is applied instantly, even whilst it is warm, to the young organs of the rising plant; and, consequently, is more likely to be efficient, than in manure that has gone through the process, and of which all the principles have entered into new combinations.

It is certainly a matter of indifference whether we employ excrements, ashes, or bones, in carrying out the principle of restoring to the soil those substances which have been taken from it by the previous crop. But, unless we know accurately what *are* those matters that have been actually removed, how is it possible to supply, otherwise than at random guess, the deficiency? Fermented dung may be really useful, if *no nitrogen* be demanded. A time will come when fields will be manured with saline solutions, with the ashes of burnt straw, or with salts of phosphoric acid prepared in chemical manufactories, with as much certainty as now, in medicine, iodine cures the Derbyshire neck, or as quinine is substituted for the bulky powdered bark in fever. The same mixed mass of materials may be useful in one state, less so in another and under other circumstances. A knowledge of the actual wants of the land, and of the exact composition of the proposed manure, is obviously necessary to enable the farmer to adapt the one to the other as a requisite and fitting remedy. If our object be the development of the *seeds* of plants, we know they contain nitrogen. Our manure then must be rich in this material. If by fermentation ammonia be formed in the manure, if it become dry, rotten, and nearly devoid of smell, having lost its previous heat; although it may cut better with the spade, we may be sure it has lost its nitrogen, and consequently, as far as our object is concerned, (the nutriment of the *seed*,) nearly lost its utility. The leaves, which by their action on the air nourish the stem and woody fibre; the roots, from which the leaves are formed; in short, every part of the structure of a plant contains nitrogen in small and varying proportions. But the *seeds* are always *rich* in nitrogen.

The most important object, then, of farming operations, at least as far as corn is concerned, is the *supply of nitrogen to corn plants* in a *state* capable of being taken up by them,—the production, therefore, of manures containing the *most* of this element. Gypsum and nitrate of soda are as properly termed manures as farm-yard dung, bone-dust, or night soil; but our present inquiry is, what class of substances contain and yield to corn-plants most NITROGEN? Nature, by the ordinary action of the atmosphere, furnishes as much nitrogen to a plant as is necessary to its bare extstence. But plants do not exist for themselves alone:—the greater number of animals depend upon the vegetable world for food; and, by a wise adjustment of nature, plants have the remarkable power of converting, to a certain degree, all the nitrogen offered to them into nutriment for animals. We may furnish a PLANT with carbonic acid, and all the materials which it may require for its mere life; we may supply it with vegetable matter in a state of decay in the most abundant quantity; but it will not attain complete development unless nitrogen be afforded to it by the supply of suitable manure: an herb will, indeed, be formed, but its seeds or grain will be imperfect and feeble.

But when, with proper manure, we supply nitrogen in addition to what the plant would derive from natural sources, we enable it to attract from the air the carbon which is necessary for its nutrition—that is, when that in the soil is not sufficient, we afford it a means of fixing the atmospheric carbon.

There are two principal descriptions of manure, the beneficial agency of which is derivable almost exclusively from the large quantity of nitrogen they yield.

These are the solid as well as fluid excrements of man and animals, their dung and urine.

URINE is employed as manure either singly, in its liquid state, or with the fæces which are impregnated with it. It is the urine contained in night-soil which gives it the property of giving off ammonia, a property which the discharges from the bowels possess only in a very slight degree. Liquid manures act chiefly through the saline substances they hold in solution; while the solid manures, even of animal origin, contain insoluble matters which decay slowly in the soil, and there become useful only after a time. When we examine what substances we add to a soil by supplying it with urine, we find that this liquid contains in solution ammoniacal salts, uric acid, (a substance itself containing much nitrogen,) and salts of phosphoric acid.

Human urine consists in 1000 parts of

Water, - - - - - - - - - - -	932
Urea, and other organic matters containing nitrogen, - -	49
Phosphates of ammonia, soda, lime, and magnesia, - -	6
Sulphates of soda and ammonia, - - - - - - -	7
Sal-ammoniac and common salt, - - - - - - -	6
	1000

In dung reservoirs, well constructed and protected from evaporation, the carbonate of ammonia, which forms in consequence of putrefaction, is retained in solution; and when the putrefied urine is spread over the land, a part of this ammonia will escape with the water which evaporates. On account of the formation of carbonate of ammonia in putrid urine, it becomes alkaline, though naturally acid in its recent state; and when this carbonate of ammonia is lost by being volatilized in the air, (which happens in most cases,) the loss suffered is nearly equal to one-half of the urine employed. So that, if we *fix* the ammonia, (by combining it with some acid which forms with it a compound not volatile,) we increase its action two-fold. Now the carbonate of ammonia formed by the putrefaction of urine can be *fixed*, or deprived of its volatility, in many ways.

If, for instance, a field be strewed with gypsum or plaster of Paris, (in chemical language, sulphate of lime,) and then sprinkled with urine, or the drainings of the cow-shed, a double exchange or decomposition takes place. Sulphate of lime and carbonate of ammonia become converted into carbonate of lime (that is, chalk) and sulphate of ammonia: and this because sulphuric acid has a greater affinity for ammonia than it has for lime. This sulphate of ammonia will remain in the soil—it will not evaporate.

If a basin containing spirit of salt, or muriatic acid, be left a few weeks in a close stable or privy, so that its surface is in free communication with the ammoniacal vapors that rise from below, crystals of muriate of ammonia, or common sal-ammoniac, will soon be visible, as an incrustation about its edges. The ammonia that escapes in this way is not only entirely lost as far as vegetation is concerned; it works also a slow but not less certain destruction of the mortar and plaster of the building. For when in contact with the lime of the mortar, ammonia is converted into nitric acid, which gradually dissolves the lime. There are few schoolboys who have not picked out crystals of nitrate of potass, or saltpetre, from an old brick wall; and in this instance the atmosphere has yielded the ammonia.

The offensive carbonate of ammonia in close stables is very injurious to the eyes and lungs of horses, as the army veterinary surgeons are well able to testify. They adopt measures to carry it off by ventilation and cleanliness. If the floors or stables of cow-sheds were strewed with common gypsum, they would lose all their offensive and injurious smell, and none of the ammonia which forms could be lost, but would be retained in a condition serviceable as manure. This composition, swept from the stable floor, nearly constitutes what is sold under the denomination of *urate*. Manufacturers of this material state, that three or four hundred weight of urate form sufficient manure for an acre: a far more promising adventure for a practical farmer will be to go to some expense in saving his own liquid manure, and, after mixing it with burnt gypsum, to lay it abundantly upon his corn-lands. For, in this way, he may use as much gypsum as will absorb the whole of the urine. Now, in the manufacture of *urate*, the proportion of 10 pounds is employed to every 7 gallons,—allowing the mixture, occasionally stirred, to stand some time, *pouring off the liquid*, and with it nearly all its saline contents, except the ammonia. Urate, therefore, can never present all the virtues of the urine—100 pounds of urate containing no greater weight of saline and organic matter than 10 gallons of urine.

From the foregoing analysis it would appear, that 1000 pounds of human urine contain no less than 68 pounds of *dry* fertilizing matter of the richest quality, worth, at the present rate of selling artificial manures in this country, at least twenty shillings per hundred weight. Suppose we say that the liquid and solid excrements of one human being amount on an average to a pound and a-half daily, then in one year they will amount to 547 pounds; which at the rate of three per cent. of contained nitrogen, would yield sixteen pounds of that material for the land, a quantity sufficient to supply enough for eight hundred pounds of wheat, rye or oats, or for nine hundred pounds of barley. As each person in reality voids at least one thousand pounds or pints of urine in a year, the national waste incurred in this form amounts, at the above valuation, to twelve shillings a-head upon every individual of the whole population of England and Wales. And if *five tons* of farm-yard manure per acre, added yearly, will keep a farm in good order, *four hundred weight* of the *solid* matter of urine would probably have an equal effect—in other words, the *excrements* of *a single individual*, are more than sufficient to yield the requisite nitrogen to an *acre* of land, in order to enable it (with the assistance of the nitrogen absorbed naturally from the atmosphere) to produce the richest possible yearly crop. Every town and farm might thus supply itself with the manure, which, besides containing the most nitrogen, contains also the most phosphates; and if an alternation of the crops were adopted, they would be most abundant. By using at the same time bones and wood ashes, the excrements of animals might be completely dispensed with. So that artificial, mineral, or chemical manures are no imperfect substitutes, if applied judiciously.

The urine alone discharged into rivers or sewers by a town population of 10,000 inhabitants would supply manure to a farm of 1500 acres, yielding a return of 4,500 quarters of corn, or an equivolent produce of other crops. The powerful agency of urine as a manure is well known on the Continent, and the Chinese justly consider it as invaluable; and they are the oldest as well as the best agriculturists in the world. Indeed so much value is attached to human excrements by the Chinese, that the laws of the country forbid that any of them should be thrown away; and reservoirs are placed in every house, where they are collected with the utmost care. *No other kind of manure is used for their corn-fields.*

Human urine contains a greater variety of constituents than any other species examined. Urea, uric acid, and another acid similar to it in nature called rosacic acid, acetic acid, albumen, gelatine, a resinous matter, and its various salts, are all valuable to the land, inasmuch as from the land they or their elements have been originally derived. The urine of animals that feed exclusively on flesh contains more animal matter, and consequently more nitrogen, than that of vegetable feeders, whence it is more apt to run into the putrefactive process and disengage ammonia. In proportion as there are more gelatine and albumen in urine, so in proportion does it putrefy more rapidly. Thus, then, all urine contains the essential elements of vegetables in a state of solution; and that will be the best for manure which contains most albumen, gelatine, and urea. Putrid urine abounds in ammoniacal salts, and is only less active as a manure than fresh urine, because of the portion of ammonia which is continually exhaling into the atmosphere.

As to the urine of cattle, it contains less water than that of man, varying with the kind of food on which the animal is fed. A cow will secrete and discharge from two thousand to three thousand gallons of urine a year; and this quantity will contain at least from 1200 to 1500 pounds of *dry solid saline matters*, worth from ten to twelve pounds sterling monies of the realm. Even in the *liquid* state, the urine of one cow, collected and preserved as it is in Flanders, is valued in that country at about £2 a-year. Any practical English farmer may easily make the calculation for himself, how much real wealth is lost in his own farm-yard, how much of the natural means of reproductive industry passes into his drains or evaporates in the air.

The urine of the cow is particularly rich in salts of potash, but contains very little soda. The urine of swine contains a large quantity of the phosphates of ammonia and magnesia. That of the horse contains less nitrogen and phosphates than that of man.

The fertilizing powers of *animal* manures, whether fluid or solid, is dependent, like that of the soil itself, upon the happy admixture of a great number, if not of all, those substances which are required by plants in the universal cultivation they receive from the industry and skill of man, more especially upon the large proportion of *nitrogen* they contain. The amount of this latter material affords the readiest test by which their agricultural value, compared with other matters and with that of each other, can be tolerably well estimated.

Ordinary farm-yard manure, in its recent state, contains a given proportion of nitrogen; but fifteen pounds of blood would yield as much nitrogen as one hundred pounds of farm-yard compost. If dried blood were taken, four pounds would be sufficient; three pounds of feathers, three of horn shavings, five of pigeon's dung, or even two and a half of woollen rags, would counterpoise one hundred of the first named material. Sixteen would be the equivalent number for the urine of the horse, ninety-one that of the cow, seventy-three for horse-dung, one hundred and twenty-five for cow-dung; while the mixed excrements of either animals would correspond with the fact that the discharges of the cow offer no resemblance to those of the horse.

Besides their general *relative* value, namely, as to the proportions of nitrogen they contain, the above matters have a further *special* value, dependent upon the diversity of saline and other organic matters which they severally contain. Thus, three of dried flesh are equal to five of pigeons' dung, as far as nitrogen is concerned; but then pigeons' dung contains a quantity of bone, earth, and saline matter, scarcely present in the former. Hence, the dung of fowls will benefit vegetation in some instances where even horse-flesh, ordinarily regarded as a strong manure, would fail. And why? Evidently because, if saline matters are deficient in the soil, an excessive supply of nitrogen will not serve as their substitute. So the liquid excretions contain much important *saline* matter not present in solid dung, nor in such substances as horn, hair, or wool; and therefore each must be capable of exercising its own peculiar influence, and be *comparatively* useless if deficient of those matters which are also found wanting, deficient, yet necessary in the soil. This affords the reason why no *one* manure can long answer on the same land; it can only supply the materials it contains. When all the silicate of potash in corn-fields is exhausted, urine will not, cannot, supply the deficiency, because it contains no silicate of potash. So long as the land remained rich in this material, urine or blood would supply the requisite nitrogen. Hence, in all ages and countries, the habit of employing *mixed* manures and artificial composts has been universally diffused. What is wanting is a more accurate knowledge of the precise deficiency at any given moment, and a consequent saving of capital from unnecessary waste, together with an immense increase in fertility, as the reward of so accurate an adaptation of means and ends. The knowledge of a disease is essential to the correct application of a remedy.

A high degree of culture requires an increased supply of manure. With its abundance, the produce in corn and cattle will augment, but must diminish with its deficiency.

From the foregoing remarks, it must be evident, that the greatest value should be attached to the *liquid* excrements of man and animals when a manure is desired which shall supply *nitrogen* to the soil. And as nitrogen is seldom wanted alone,—and as, generally, in practice, both liquid and solid excrements are found associated, containing, besides nitrogen, many other essential and invaluable ingredients,—too much care cannot be taken, not only in preserving them, but, which is equally important, in securing to the land the full value of their operation, by applying them, in the best possible condition, for the development of their powers.

We have already alluded to the loss sustained by the fermentation of dung-heaps. As we observed, in an earlier section, when it is considered that, with *every pound of ammonia* which evaporates, a loss of *sixty pounds* of corn is sustained, and that, with every pound of urine, a pound of wheat might be produced, the indifference with which liquid refuse is allowed to run to waste is quite incomprehensible. That it should be allowed to expend its ammonia by fermentation in the dung-heap, and evaporation into the atmosphere, is ascribable solely to *ignorance* of the elementary outlines of that science which hitherto the practical farmer has thought it no disgrace, but rather an honor to publish, glorying in his utter disregard of all bookish knowledge, and substituting his own notions of wasteful and vague experience, for the calm deductions of sound and rational investigation. In most places, only the solid excrements impregnated with the liquid are used; and the dung-hills containing them are protected neither from evaporation, nor from rain. The solid excrements contain the insoluble, the liquid excrements all the soluble phosphates; and the latter contain, likewise, all the potash which existed as organic salts in the plants consumed by the animals which feed upon them.

It is by no means difficult to prevent the destructive fermentation and heating of farm-yard compost. The surface should be defended from the oxygen of the atmosphere. A compact marl, or a tenacious clay, offers the best protection against the air; and before the dung is covered over, or, as it were, sealed up, it should be dried as much as possible. If the dung be found at any time to heat strongly, it should be turned over, and cooled by exposure to air. Watering dung-hills is sometimes recommended for checking the process of putrefaction, and the consequent escape of ammonia; but this practice is not consistent with correct chemistry. It may cool the dung for a short time; but moisture is a principal agent in all processes of decomposition. Water, or moisture, is as necessary to the change as air; and to supply it to reeking dung, is to supply an agent which will hasten its decay.

If a thermometer, plunged into the dung, does not rise much above blood-heat, there is little danger of the escape of ammonia. When a piece of paper, moistened with spirit of salt, or muriatic acid, held over the steams arising from a dung-hill, gives dense fumes, it is a certain test that decomposition is going too far; for this indicates that ammonia is not only formed, but is escaping to unite with the acid in the shape of sal-ammoniac.

When dung is to be preserved for any time, the situation in which it is kept is of importance. It should, if possible, be defended from the sun. To preserve it under sheds would be of great use, or to make the site of a dung-hill on the north side of a wall. The floor on which the dung is heaped, should, if possible, be paved with flat stones; and there should be a little inclination from each side towards the centre, in which there should be drains, connected with a small well, furnished with a pump, by which any fluid matter may be collected for the use of the land. It too often happens, that a heavy, thick, extractive fluid is suffered to drain away from the dung-hill, so as to be entirely lost to the farm.

Night-soil, it is well known, is a very powerful manure, and very liable to decompose. Human excrements differ in their composition, but always abound in nitrogen, hydrogen, carbon, and oxygen. From the analysis of Berzelius, it appears that a part of it is always soluble in water; and in whatever state it is used, whether recent or decomposed, it supplies abundant food to plants. But this affords no excuse for its misapplication in any other condition than that which is most profitable. It varies, no doubt, in richness with the food of the inhabitants of each district,—chiefly with the quantity of *animal* food they consume,—but, when dry, no other SOLID manure, weight for weight, can probably be compared with it in general efficacy. The soluable and saline matters it contains are made up from the constituents of the food we eat; of course, it contains most of those elementary substances which are necessary to the growth of the plants on which we live. The disagreeable smell of night-soil may be destroyed by quick lime. If exposed to the air in thin layers strewed over with lime, in fine weather, it speedily dries, is easily pulverized, and, in this state, may be used in the same manner as rape-cake, and delivered into the furrow with the seed. If night-soil be treated in a proper manner, so as to remove the moisture it contains, without permitting the escape of its ammonia, it may be put into such a form as will allow it to be transported even to great distances. This is already attempted in many places; and the preparation of human excrements for exportation constitutes not an unimportant branch of industry. But the manner in which this is done, is not always the most judicious. In Paris, the excrements are preserved in the houses in open casks, from which they are collected and placed in deep pits at Montfaucon; but they are not sold till they have attained a certain degree of dryness by evaporation in the air. But whilst lying in the receptacles appropriated for them in the houses, the greatest part of their urea is converted into carbonate of ammonia; lactate and phosphate of ammonia are also formed, and the vegetable matters contained in them putrefy; all their sulphates are decomposed, whilst their sulphur forms sulphuretted hydrogen. The mass, when dried by exposure to the air, has lost more than half of the nitrogen which the excrements originally contained; for the ammonia escapes into the atmosphere along with the water which evaporates; and the residue now consists principally of phosphate and lactate of ammonia, and small quantities of urate of magnesia and fatty matter. Nevertheless, it is still a very powerful manure; but its value as such would be twice or four times as great, if the excrements, before being dried, were neutralised with a cheap mineral acid.

In other manufactories of manure, the excrements, whilst still soft, are mixed with the ashes of wood, or with earth; both of which substances contain a large quantity of caustic lime, by means of which a complete expulsion of all their ammonia is effected, and they are completely deprived of smell. But such a residue applied as manure, can act only by the phosphates which it still contains; for all the ammoniacal salts have been decomposed, and their ammonia expelled. In London, night-soil is dried with various mixtures; while, in other of our large towns, what is called "animalized charcoal" is prepared by mixing and drying night-soil with gypsum and ordinary wood charcoal in fine powder. In all cases, the excrements of human beings contain *more* nitrogen than those of any other animal. Berzelius obtained, by the burning of 100 parts of dried excrements, 15 parts of ashes, principally composed of the phosphates of lime and magnesia.

It is quite certain that the *vegetable* constituents of the excrements with which we manure our fields, cannot be entirely without influence upon the growth of the crops on them; for they will decay, and thus furnish *carbonic acid* to the young plants. But it cannot be imagined that their influence is very great, when it is considered that a good soil is manured only once every six or seven years; that the quantity of carbon thus given to the land corresponds only to 5 per cent. of what is removed in the form of herbs, straw, or grain; and further, that the rain-water received by a soil contains much more carbon in the form of carbonic acid than these vegetable constituents of animal excrement.

The *peculiar* action, then, of SOLID, as opposed to fluid, animal excrements, is limited to their *inorganic* constituents, rather than to the presence of the partially changed vegetable or organized matter which they contain. Horse dung contains a large proportion of such partially altered vegetable matter; and the reason why night-soil is a more powerful manure, is that, relatively, it contains less vegetable matter, while nitrogen is more abundant; and this, principally, because its weight is materially made up by the liquid excrement, or urine, always forming part of its composition. Now, urine easily putrefies, and yields ammonia largely; and this because of its containing more animal matter than is contained in dung. A horse lives exclusively on vegetables; and 100 pounds of the urine of a healthy man, (living, of course, partially upon flesh, and partly upon those seeds and parts of plants containing nitrogen, in quantity,) will yield as much nitrogen as 1300 pounds of fresh horse-dung, or 600 of cow-dung. We cannot ascribe much of the power of the excrements of cattle, sheep, and horses, to the *nitrogen* which *they* contain, for the quantity derivable from these vegetable feeders is too minute. The restoration of *inorganic* matter to the land, is the *chief* value arising from the application of the dung of cattle. A certain amount of inorganic matter is removed with every crop. If we manure that land with the dung of the cow or sheep, we restore to the surface silicate of potash, and some salts of phosphoric acid. If we use horse-dung, we supply, chiefly, phosphate of magnesia and silicate of potash. In the straw which has served as litter, we add a further quantity of silicate of potash, and phosphates, which, if the straw be already putrefied, are exactly in the same state as before they formed part of the crop which yielded them.

But, if we use human excrements, in addition to the phosphates of lime and magnesia, we supply a larger proportion of compounds of nitrogen, essential to the development of those parts of plants upon which human beings are accustomed to feed: and, by a wise ordination, corn-plants are found associated with human dwellings,—in other words, the family of man having selected such spots on the earth's surface, as are fitted for the growth of corn, animal manure is always at hand in quantity for its artificial cultivation; thus restoring, through the feculent discharges of man and animals resident on the spot, precisely those materials which the process of growth has removed from the soil.

Cow-dung is not incorrectly said to be "cold:" so much of the saline, nutritive, and other organic matters from the cow, pass off almost exclusively with her urine, that her dung does not readily heat and run into putrefaction. Still, mixed with other manures, or well diffused through the soil, its vegetable matter is not useless. It loses more than any other similar substance in drying. The dung of pigs is soft and *cold*, like that of the cow, containing, like it, nearly 80 per cent. of water. Mixed with other manures, it may be applied to any crop; but is of very variable quality, owing to the variety of food of the animal.

The horse is fed, generally, on less liquid food, less succulent and watery than that of oxen. He discharges less urine,—hence his dung is richer in animalized matter: or, adopting the figurative language of the farmer, it is *hotter*, and, indeed, runs more readily into the putrefactive fermentation.

If the *solid* excrements of animals are chiefly valuable for the saline, earthy, and inorganic constituents they restore to the soil which has yielded them, it will be readily inferred, that instead of dung or night-soil, other substances, containing their peculiar ingredients, may be substituted. One hundred tons of fresh horse-dung, if dried, would only leave from 25 to 30 tons of solid matter, the rest being only water; and if this dried matter (itself only one-fourth of the original weight) were burnt, so as to decompose its vegetable ingredients, we should obtain, perhaps, 10 per cent. of really useful saline and earthy matters, (one-fortieth of the original weight,) according to the richness or poverty of the food the horse had taken.

Now, this *minute* proportion of saline and earthy matters, and its *relative quantity*, in the various kinds of dung or excrement, forms, evidently, the chief topic of interest to which our attention should be directed; inasmuch as what is left upon such examination and analysis, is exactly what has made up the component inorganic parts of the hay, straw, grass, or oats, on which the animal has been fed; or, in other words, exactly what has been removed from the soil, and requires to be replaced, if the next crop is to equal the last. If our object is increased fertility, more must be added than has been taken away. Hay, straw, and oats, formed (for illustration's sake) the food of a horse. Their principal constituents are the phosphates of lime and magnesia, carbonate of lime, and silicate of potash; the first three of these preponderated in the corn, the latter in the hay, and these, removed from the soil with the crop, are precisely the saline matters which would be found in the excrement of the animal for whose support that crop was intended.

In order, then, to atone for the absence of that excrement which derives its value from the soil which has produced it, and for which it is peculiarly fitted, as containing what that soil has lost, the *ashes of wood* or *bones* may often be judiciously substituted; and for this reason: wood-ashes contain silicate of potash, exactly in the same proportion as that salt is found to exist in the *straw* of the last crop; and as to *bones*, the greatest part of their bulk consists of the phosphates of lime and magnesia. Ashes obtained from various trees are of unequal value: those from oak-wood are the least, those from beech most serviceable. With every 100 pounds of the ashes of the beech spread over a soil, we furnish as much *phosphates* as 460 pounds of fresh night-soil could yield. But night-soil contains other useful matters besides phosphates; hence the utility of mixed composts, as, evidently, the ashes of the beech would not alone secure fertility.

Bone manure possesses still greater importance than wood ashes as a substitute for an indefinite and large supply of animal excrement. The primary sources from which the bones of animals are derived are,—the hay, straw, or other substances which they take as food. Now, bones contain more than half their weight of the phosphates of lime and magnesia; and hay contains as much of these salts as wheat straw. It follows, then, that 8 pounds of bones contain as much phosphate of lime as 1000 pounds of hay or wheat straw; and 2 pounds of bones as much as is found in 1000 of the grain of wheat or oats. These numbers express pretty exactly the quantity of *phosphates* which a soil yields annually on the growth of hay and corn. Upon every acre of land appropriated to the growth of wheat, clover, potatoes, or turnips, forty pounds of bone-dust will be found sufficient to furnish an adequate supply of *phosphates* for three successive crops.

To secure the best application of bones, they should be reduced to powder; and the more intimately they are mixed with the soil, the more easily are they taken up and assimilated. The most easy and practical mode of effecting this, is to pour over the bones, in powder, half their weight of sulphuric acid, (or oil of vitriol,) diluted with three or four parts of water; and after they have remained in contact for some time, say a fortnight, to add one hundred parts of water, and sprinkle this mixture over the field before the plough. Bones may be preserved unchanged, for thousands of years, in dry, or even in moist soils, provided the access of rain be prevented, as is exemplified by the bones of animals, buried previous to the flood, found in loam or gypsum: the interior parts being protected by the exterior from the action of water. But they become warm when reduced to a fine powder; and moistened bones generate heat, and enter into putrefaction;—the gelatine which they contain is decomposed, and its nitrogen converted into carbonate of ammonia, and other ammoniacal salts, which are retained, in a great measure, by the powder itself. Bones burnt till quite white, and recently heated to redness, will absorb seven times their volume of ammoniacal gas. The analysis of bone enables us to say, that while 100 pounds of bone-dust add to the soil 33 of gelatine, the *organized* substance of horn, or as much organized matter as is contained in 300 or 400 pounds of blood or flesh, they add, at the same time, more than half their weight of *inorganic* matter, lime, magnesia, soda, common salt, and phosphoric acid, in combination with some of these;—all of which, as we have seen, must be present in a fertile soil, since the plants require a certain supply of them all at every period of their growth, but more especially during the maturation of the straw and grain. These substances, like the inorganic matter of plants ploughed into the soil, may, and do exert a beneficial agency upon vegetation after all the organized structure of such decaying plants is broken up and destroyed. One hundred parts of *dry* bones contain 33 per cent. of dry gelatine, and are equivalent to 250 parts of recent human urine. We do not speak now of the bone-dust which remains after all the animal gelatine is removed, in boiling them to extract size for the calico-printer.

HORN is a still more powerful manure than bone,—that is to say, it contains a greater proportion of organized animal matter. The peculiarity is, that horn, hair, and wool, as organized substances, are *dry;* while blood and flesh contain from 80 to 90 per cent. their weight of water. Hence, a ton of horn-shavings, of hair, or of dry woolen rags, ought to enrich the soil with as much animal matter, (and consequently nitrogen,) as would be yielded by ten tons of blood. In consequence of this dryness, horn and wool decompose more slowly than blood; and hence, the effect of soft animal matters is more immediate and apparent than that of hard and dry animal matters, the action of which is, nevertheless, stronger, and continues for a longer period.

The refuse of the different manufactories of skin and leather form very useful animal manures; such as the shavings of the currier, furrier's clippings, and the offals of the tan-yard and of the gluemaker. The gelatine contained in every kind of skin is in a state fitted for its gradual decomposition; and when buried in the soil, it lasts for a considerable time, and constantly affords a supply of nutritive matter to the plants in its neighborhood. These manures contain nitrogen as well as phosphates, and, consequently, are well fitted to aid the process of vegetable growth.

From what has been stated, we may arrive at the following conclusions :—

1. That fresh human urine yields nitrogen in greater abundance to vegetation than any other material of easy acquisition ; and that the urine of animals is valuable for the same purpose, but not equally so.

2. That the mixed excrements of man and animals yield, (if carefully preserved from further decomposition,) not only nitrogen, but other invaluable saline and earthy matters that have been already extracted in food from the soil.

3. That animal substances which, like urine, flesh, and blood, decompose rapidly, are fitted to operate *immediately* and powerfully on vegetation.

4. That *dry* animal substances, as horn, hair, or woollen rags, decompose slowly, and (weight for weight) contain a greater quantity of organized as well as unorganized materials, manifesting their influence it may be for several seasons.

5. That bones, acting like horn, in so far as their animal matter is concerned, and like it for a number of seasons more or less, according as they have been more or less finely crushed, may ameliorate the soil by their earthy matter for a long period, (even if the jelly they contain have been injuriously removed by the size maker,) permanently improving the condition and adding to the natural capabilities of the land.

CHAPTER IX.

Of the comparative Value of Vegetable Manure, as contrasted with Animal Excrements.

It may be asked, if the principal sources of the nitrogen required for the artificial forcing of corn-plants be the feculent excretions of man and animals,—if the object be chiefly to replace in the soil those matters which have been abstracted with the previous crop,—how is it that such excrements more effectually restore those elements, than would occur if the ripe crop were ploughed into the soil ; in other words, how is it that dung and urine are richer in nitrogen than the food from which they are formed ?

The answer is easy and obvious. The BULK of a vegetable is chiefly woody fibre or carbon. A horse lives exclusively upon vegetables, and discharges from his lungs, in breathing, a large portion of the carbon his food contains; hence, what is left to be thrown off from his kidneys and bowels, contains *relatively* a greater proportion of nitrogen which could only be otherwise feebly supplied to the soil from the rain-water of the atmosphere, while the air yields to the land carbon in abundance. Nearly the whole of the nitrogen contained in his food, (indeed, all beyond what is necessary for the wants of his own living system,) is thrown off in his urine and dung. In the food consumed, the carbon was to the nitrogen as 9 to 1: in that which remains, after breathing has done its work, the carbon is to the nitrogen in the proportion of only 2 to 1. It is out of this residue, *rich in nitrogen*, that the several parts of animal bodies are built up. Warm-blooded animals with capacious lungs, double and triple their weight very rapidly after birth: they take in (as lambs or calves after separation from the parent) only vegetable food; but the rapidity of its decomposition is the index or ratio of the rapidity of their growth. Their actions are lively; and the playful exertion of their muscles renders the decomposing play of the heart, and consequently of the lungs, more frequent than when fully grown. During their quick growth, they *absorb* all the nitrogen their food contains, while they throw off carbon from the lungs. After growth is finished, they still throw off, in breathing, nearly all the carbon, while the residual quantity of nitrogen (not wanted for the purposes of the living system) escapes in the dung and urine. The urine of a child would not, upon putrefaction, disengage the same quantity of ammonia as that of a full-grown man. Hence the reason why bodies can be nourished and built up upon food comparatively poor in nitrogen; and yet not only do those same bodies contain nitrogen in quantity, but also their excretions are rich in the same element. The more nitrogen that is appropriated by growing cattle, the less will pass off into the fold-yard; hence it is natural to expect that the manure, either liquid or solid, which accumulates where many young animals are fed, will not be so *rich* as that yielded by full-grown cattle, unless, by giving richer food to the young cattle than they actually require or can dispose of, the difference to the dung-heap be made up. A little acquaintance, then, with first principles will explain the seeming difficulty, how it is that the dung or urine of animals has a greater fertilizing power than even the whole weight of the food which they have consumed would have, if laid upon the soil. Its carbon has passed through the lungs of animals that have eaten it into the atmosphere: and the soil can always supply itself with sufficient carbon from the decomposition of the carbonic acid of the air; while its *natural* supply of nitrogen for the plants which grow on its surface is *limited* to the decomposition of the ammonia, and the evolution of nitrogen from rain-water,—a quantity which, though sufficient for the sustenance of crabs, will not serve for apples; and we must remember, that corn-plants are not in a state of nature,—wild oats or potatoes are widely different from the same plants under the care and culture of man. The difference between a wild and a cultivated vegetable is not merely an increment of *size*, but the development of those parts which, though *naturally* containing nitrogen, contain, *proportionally*, far less than by artificial culture they may be compelled to take up.

The doctrine of the proper application of manures from organized substances offers an illustration of an important part of the economy of nature, and of the happy order in which it is arranged. The death and decay of animal substances tend to resolve organized forms into elementary constituents ; and the pernicious effluvia disengaged in the process seem to point out the propriety of burying them in the soil, where they are fitted to become the food of vegetables. The fermentation and putrefaction of organized substances in the free atmosphere are noxious processes : beneath the surface of the ground, they are salutary operations. In this case, the food of plants is prepared where it can be used, and that which would offend the senses and injure the health, if exposed, is converted, by gradual processes, into forms of beauty and of usefulness : the stinking gas is rendered a constituent of the perfume of a flower ; and what might be poison, swells the food of animals and man.

CHAPTER X.

Of Manures of Mineral Origin, or Fossil and Artificial or Chemical Manures ; their Preparation, and the Manner in which they Act. Of Lime in its Different States ; its Operation as a Manure. Of Alkalies, and Common Salt, as to their Action upon the Land.

From what has been already said, a great variety of substances contribute to the growth of plants, and supply the materials of their nourishment. How matters that have once been living are in turn converted into the substance of other living things, may be comprehended ; but it is more difficult to understand those operations by which earthy and saline matters are taken up and consolidated in the fibre of vegetables.

Sir Humphrey Davy, quoting the experiments of continental chemists who had preceded him, states, on their authority, that different seeds sown in fine sand—flour of brimstone, or rust of iron, and supplied only with air and water, produced healthy plants, which by analysis yielded various earthy and saline matters, which either were not contained in the seeds or the material in which they grew ; and hence they and he concluded, that they must have been formed from air or water, in consequence of the agencies of the living organs of the plant.

It would be impossible to pass this interesting fact, without observing how strikingly it confirms the views advanced in the preceding pages as to the origin of nitrogen from the ammonia in rain-water. Sir Humphrey contends, from some subsequent experiments, that the atmosphere yields no saline matter to plants; but the existence of ammonia in rain-water, if not unknown to that distinguished chemist, was overlooked in his computation.

The only substances that can, with propriety, be called *fossil manures*, and which are found unmixed with the remains of any organized beings, are certain alkaline earths, or alkalies, and their combinations.

The only alkaline earths which have been hitherto applied in this way, are LIME and *magnesia.* Potash and soda, the two fixed alkalies, are both used in certain of their chemical compounds, but never in a pure or caustic state.

The most common form in which LIME is found on the surface of the earth, is in a state of combination with carbonic acid. We have already alluded to some of its chemical properties in a previous section of this work. When common limestone is burnt in the kiln, the carbonic gas is driven off by the heat, and nothing remains but the pure caustic earth. If the fire have been very high, it approaches to one-half the weight of the stone; but, in common cases, limestones, if well dried before burning, do not lose much more than from 35 to 40 per cent., or from 7 parts to 8 out of 20.

Very few limestones, or chalks, consist entirely of lime and carbonic acid. Statuary marble is nearly a pure carbonate of lime. When a limestone does not copiously effervesce in acids, and is yet sufficiently hard to scratch glass, it contains the earth of flint, and, probably, the earth of clay. When brownish or yellowish-red, the tinge, in all probability, depends upon the presence of iron. If not hard enough to scratch glass, if the stone effervesce slowly or but slightly with acids, and the solution have a *milky* appearance,—most probably *magnesia* is present.

Before any opinion can be formed of the manner in which the different ingredients in limestones modify their properties, and their consequent action upon the soil, it will be necessary to consider the action of pure, or recently burnt caustic lime, when employed for agricultural purposes.

Quicklime,—in its pure state, whether in powder, or dissolved in minute proportion, in water,—is *directly injurious to plants.* Grass may be certainly killed by sprinkling it with lime water; but since lime is a necessary ingredient in soils, and an useful addition in many cases, it evidently must be that its combination with carbonic acid—the state in which it is found naturally—is the circumstance which not merely renders it void of causticity, but so far alters its properties, as to exchange injury for advantage. Lime, if pure, and recently burnt, cannot long remain caustic, inasmuch as it rapidly attracts sufficient carbonic acid from the atmosphere to reduce it to the state of chalk, or a carbonate; and it is a wise arrangement that it is so,—that it is never found, in nature, pure or free from this acid.

Nevertheless, there are cases in which the application of caustic lime may be requisite. If it be mixed with any moist, fibrous, vegetable matter, there is a strong action between the lime and the vegetable fibrin: they form a kind of compost together, of which a part is usually soluble in water. By this kind of operation, lime renders matter which was comparatively inert, nutritive, or, at least, soluble; and as charcoal and oxygen abound in all plants, the lime becomes at the same time usefully converted, even by their agency, into a carbonate. It is obvious, then, that the operation of quicklime, and that of marl or chalk, depends upon principles altogether different. Quicklime, in being applied to land, tends to bring any hard vegetable matter that it contains into a more rapid and easy state of decomposition; while chalky forms of lime only add the necessary amount of this earth, so as to furnish the requisite supply to be absorbed as part of the inorganic structure of the plants which grow in that spot. Quicklime, when it becomes mild by exposure, acts in the same way as chalk, but, in the act of becoming mild, it prepares soluble out of insoluble matter.

It is upon this circumstance that the operation of lime in the preparation for wheat crops depends, and its efficacy in fertilising peats, and in bringing into a state of cultivation all soils abounding in hard roots, dry fibres, or undecomposed and, therefore, useless vegetable matter.

So, then, the solution of the question, Whether quicklime ought to be applied to a soil? depends upon the quantity of the undecomposed vegetable matter that soil contains; and the answer to the question, Whether marl, or any chalky carbonate of lime, ought to be applied? evidently depends upon whether the previous crops have exhausted the requisite quantity of lime necessary to form part of the inorganic material of the crop that is intended to be raised there. All soils are improved by mild lime, because each successive crop takes a portion of lime away. But, perhaps, one of the most important and influential agencies of lime in soil to which it is added, is to be found in its ready combination with *nitric acid*, which it assists in forming, from the facility with which it promotes the union of its already existing elements, *nitrogen* and *oxygen*. NITRATE OF LIME, which, by a series of inevitable actions, is produced in the decomposing soil, is very soluble in water: entering readily into the roots of plants, it forms the medium by which lime becomes part of a vegetable, (for, as before stated, the earths and alkalies never enter a plant in a pure, free, caustic, or uncombined state,) and producing upon growth effects precisely similar to those of the now well-known *nitrate of soda*. Ploughing, harrowing, digging, and turning over the soil to the action of the air, is useful, chiefly, because it facilitates the more ready action of the atmosphere, indispensable to the formation of these *nitrates*.

Besides pure, or caustic lime, and its carbonate, in the form of chalk or marl, the application of *gypsum*, or SULPHATE OF LIME,—sometimes called alabaster, or plaster of Paris,—deserves a passing notice. Great difference of opinion has prevailed among agriculturists as to its use. Correct notions as to the nature of vegetable growth, an exact acquaintance with the constitution of plants intended to be raised upon a given locality, and the admitted necessity for an equally exact acquaintance with the existing condition of that soil, so as to adapt the one to the other,—in fact, a better knowledge of agricultural chemistry,—is all that alone is wanting, or can solve the variety of opinion as to its employment. Plaster of Paris has been advantageously used in England, and various testimonies as to its utility have been laid before the Board of Agriculture. Doubtlessly, if lime be deficient in a soil, though marl, or the carbonate, is more easily susceptible of action, the sulphate or gypsum, which is less so, less easily decomposed, is better than none. Sulphuric acid has a stronger affinity for lime than carbonic acid can exert; hence, gypsum does not so readily enter into new combinations. It has been said, that sulphate of lime assists the putrefactive decomposition of animal substances,—that it hastens the evolution of ammonia, and the consequent development of nitrogen; but the experiments of Sir Humphrey Davy disprove this view of the case. It would appear that peat-ashes naturally contain gypsum in abundance. These peat-ashes are used with advantage in some parts of the country, as a top-dressing for cultivated grasses, particularly clover; and, in examining the ashes of sainfoin and clover, they have been found to contain gypsum in quantity, proving that lime, in the form of a sulphate, is a necessary ingredient in the constitution of some vegetables. The practical deduction from such investigations obviously is, that if clover be intended to be raised upon a soil deficient of lime, in the form of a sulphate, gypsum will not only constitute an advantageous manure, but one that is absolutely essential to the production of a vigorous, abundant, and healthy crop.

Phosphate of lime is another combination of this earth with an acid. It forms the greatest part of calcined bones, of the utility and application of which we have already spoken. It exists in most excrementitious substances, and is an essential constituent of the straw and grain of wheat, barley, oats, and rye, and likewise in beans, peas, and vetches. It exists in some places, in these islands, native, but only in small quantities. Phosphate of lime is generally conveyed to the land in the composition of other manure, and is absolutely necessary to corn crops. Bone-ashes, ground to powder, are useful on arable land that is deficient in lime, or its phosphate, especially if there be a superabundance of vegetable matter. If lime, or its phosphate, be the only deficient ingredient in the land,—if it already contain, or be at the same time supplied with animal manure, yielding nitrogen,—then bone-dust may prove useful.

WOOD-ASHES consist principally of the vegetable alkali, or potash, united to carbonic acid; and as this alkali is found in almost all plants, it is not difficult to conceive that it may form an essential part of their organs. The general tendency of the alkalies applied as manure is, to supply the deficiency occasioned by what is removed with the previous crops. Wood-ash contains not only carbonate of potash, but also the sulphate of potash and *silicate* of potash; hence its utility, as affording silex to wheat straw,—a material essential to its firmness and stability. These saline matters in wood-ash are all valuable, as supplying the necessary inorganic constituents of plants; and hence the extensive use of wood-ash, as a manure, in every country where it can readily be procured.

Peat-ashes vary, in constitution, with the kind of peat from which they have been prepared. They often contain traces of potash and soda, and generally a quantity of sulphate and carbonate of lime, a trace of phosphate of lime, and much siliceous matter. In almost every country where peat abounds, the value of peat ashes, as a manure, has been more or less generally recognised.

Kelp. The ash left by the burning of sea-weed contains potash, soda, silica, sulphur, and several other of the inorganic constituents of plants, and is usefully and extensively employed in many districts near the sea, where plants naturally requiring these materials grow more luxuriantly than in more inland districts. Sea-weeds decompose with great rapidity when collected in heaps and laid upon the land. During their decay, they not only yield inorganic saline matter to the soil, but enrich it with an additional layer of vegetable mould.

Nitrate of soda, and *nitrate of potash* or *saltpetre.* These substances have been much commended for their beneficial action upon *growing* plants. They impart to the leaves a deeper green, and evidently quicken vegetable action: they are applied advantageously to grass and young corn, at the rate of a hundred weight of either to an acre. The nitric acid they contain yields the additional nitrogen beyond the quantity the plants can obtain by decomposing the ammonia contained in the rain that falls upon them; at the same time, the other ingredient—potash or soda, as the case may be—is put within the reach of their roots, to be absorbed as an inorganic, yet necessary constituent.

Common salt, muriate of soda, or, more correctly, a compound of the metal sodium with elementary chlorine, is undoubtedly indispensable to the fertility of many *inland* soils. It is not without design that the spray of the sea is allowed to be borne by the winds for many miles over the shore, so supplying an ample dressing of common salt to the land. A minute quantity is absolutely necessary to the healthy growth of all our cultivated crops, and most lands (in this island at least) contain a sufficient quantity of it for the purposes of vegetation. Common salt is found in every species of animal manure, and will be found most requisite in high situations exposed to the washing of heavy rains, which tend to remove the soluble alkaline matters from the soil. Much diversity of opinion has prevailed as to the utility of this substance. The Cheshire farmers plead in its favor. On the other hand, that salt in large quantities, renders land barren, was known long before any records of agricultural science existed. We read in Scripture, that Abimelech took the city of Shechem, and sowed the land with salt, that the spot might be forever unfruitful. Pliny, a Latin historian, though he recommends giving salt to cattle, yet affirms, that when strewed over land it renders it barren. But these form no argument against the proper application of it. There can be no question that salt, as well as many other similar mineral substances, are really useful to vegetation; yet the intelligent agriculturist ought not to be surprised to find, that a substance which is useful, because necessary and deficient in one instance, may be positively in excess, and consequently injurious, if added in another. He will try cautiously, and upon a small scale, whether this or that material seems fitted to answer his intention; or, what is far better than blind hit-or-miss experiment, he will endeavor to ascertain the actual constitution of the soil, and not expect to grow wheat where there is no phosphate of lime or silicate of potash; nor plants which thrive best near the sea, in a soil which he knows to be devoid of common salt. If salt be there, it is a needless and foolish waste to attempt to improve the land by adding more. If he has already brick enough at hand, you must carry the builder mortar: more bricks will not supply the place of mortar. So, if the soil contain lime, or magnesia, or potash, in sufficient abundance for the wants of the plant it is our object artificially to force, it may still be deficient of other materials; and here the skill and science of one man stand in beautiful contrast with the blundering, bungling guesses of another.

At a meeting of the Chemical Society, a paper was lately read, containing a report of some experiments with saline manures containing nitrogen, conducted on the Manor Farm, Havering-atte-Bower, Essex, in the occupation of C. Hall, Esq., communicated by W. M. F. Chatterly, Esq. The experiments were suggested by the prevailing opinion, that the fertilizing power of some animal manures, and of the salts, nitre, (nitrate of potash,) nitrate of soda, and sulphate of ammonia, depend upon the proportion of nitrogen they contain. The salts mentioned are all, from their low price, within the reach of the farmer; and the quantity of the last thrown into the market is greatly increasing from the extension of the new mode of purifying coal-gas from its ammonia, by washing the gas with diluted sulphuric acid. The interest also of experiments with salts is greater than with mixed manures, both to the farmer, who, from the nature of the former substances, may depend upon their uniformity, and to the chemist, as their composition is necessarily known to him. A field of wheat was chosen, which, in the latter end of April, 1842, presented a thin plant; the salts were top-dressed over the land by hand, on the 12th of May, and the crop mowed on the 10th of August. The soil was rather poor, consisting of a heavy clay upon a subsoil of the London clay. 1. No manure; corn per acre, 1413 lbs. 2. With 28 lbs. of sulphate of ammonia; corn, 1612 lbs. 3. With 140 lbs. of the same salt; corn, 1999 lbs. 4. With 112 lbs. of nitrate of soda; corn, 1905 lbs. 5. With 112 lbs. of nitre; corn, 1890 lbs. The increase in the straw was also considerable in all cases, except with the small proportion of sulphate of ammonia. The total increase in the four manured crops was per cent., in the order in which they were enumerated,—14.1, 41.5, 34, and 33.5. The cost of the manure for the three last did not greatly differ, being 21s. 9d., 24s. 6d., 27s. 6d.; and the profit on the outlay was, with the small dose of sulphate of ammonia, 294 per cent.; with the large dose, 212 per cent.; with the nitrate of soda, 138 per cent.; and with the nitrate of potash, 92 per cent. The principal conclusions drawn by the author are, that the increase of nitrogen in the crop is greater than is accounted for by the nitrogen of the manures, showing that these manures have a stimulating effect, or enable the plants to draw additional nitrogenized food from the soil and atmosphere; the considerable superiority of sulphate of ammonia over the other salts, and the greater proportional efficiency of a small, than of a large dose of that salt. The sulphate of ammonia costs 17s. per cwt. It appears best to apply this salt in the proportion of about 1 cwt. per acre, at three different dressings: the first quantity when the crop of wheat makes its spring growth, or if of oats, when about two inches above the ground; the second quantity about a month afterwards; and the third at the time of the formation of the ear. To meet the practical difficulty of distributing so small a quantity as one-third of a hundred weight over an acre, about twice the quantity of common salt or of soot may be mixed with the ammoniacal salt. These, and most saline manures, when used as a top-dressing, should be supplied to the plant when dry, after a shower of rain, or during hazy weather.

That which was true in the day of Sir Humphrey Davy, when experimental agricultural chemistry was in its infancy, is equally true at the present moment. He observes that "much of the discordance of the evidence relating to the efficacy of *saline* substances depends upon the circumstance of their having been used in varying proportions, and in general in quantities much too large." That which is salutary and medicinal in moderate doses, not only may be, but is absolutely poisonous in another.

Sir Humphrey made a number of experiments on the effects of different saline substances on barley and on grass growing in the same garden, the soil of which was a light sand, of which 100 parts were composed of 60 parts of siliceous sand, and 24 parts finely-divided matter, consisting of 7 parts carbonate of lime, 12 parts alumina and silica, less than one part saline matter, principally common salt, with a trace of gypsum and magnesia; the remaining 16 parts were vegetable mould. The solutions of the saline substances were used twice a week, in the quantity of two ounces on spots of grass and corn, sufficiently distant from each other to prevent any interference of results. Several of the salts of potash, soda, magnesia and ammonia were experimentally and separately employed. He found that in all cases, when the quantity of the salt equalled *one-thirtieth* part of the weight of the water, the effects were injurious; but least so with the salts of ammonia. When the quantities of the salts were one part in three hundred of the solution, or 1 pound to 300 pounds of water, the effects were different. Those spots watered with the solution of carbonate of ammonia were most luxuriant of all. This last result is what might be expected, (and it agrees well with the theoretic views of later chemists,) inasmuch as carbonate of ammonia is made up of carbon, oxygen, hydrogen, and nitrogen: all of which are essential to the supply of the additional quantities artificial plants require beyond that they can naturally obtain from the surrounding atmosphere. He observes that the solution of *nitrate of ammonia* seemed to be of no greater use than *rain-water*, and he attributes its failure to the circumstance of the acid being in excess. But Sir Humphrey was not aware that rain-water actually contains ammonia; it was left to the genius of Liebeg, in our later day, to develope that discovery.

CHAPTER XI.

Of the Composition of Productive Soils, and of the Agency of the Elements in their Natural Formation, from the Rocks upon which they rest.

We may now take it for granted that every practical farmer will admit the position as proved, namely, that there must be an exact adaptation and fitness between the condition of any given soil and the plants intended to be raised upon it: and that, if this condition does not exist naturally, it not only may be, but must be, artificially remedied.

At this stage of the inquiry, it will be our endeavor to anticipate further question, and to give an exact account of the chemical constitution of such soils as are known to be best suited to the cultivation and growth of green as well as corn crops.

There are in existence as many varieties of soils as there are species of rocks exposed at the surface of the earth. In fact, there are many more. Independently of the changes produced by cultivation and the exertions of human labor in tearing down and breaking up the surface, the materials of various layers have been mixed together and carried from place to place by various great alterations that, during a succession of ages, have been silently yet constantly carried forward in the system of our globe, together with the united agencies of air, water, and the varying alternations of summer's heat and the cold of winter.

To attempt to class soils with scientific accuracy would be a needless labor; the distinctions adopted by farmers are sufficient for our present purpose, particularly if some degree of exactitude be maintained in the application of terms. A full knowledge of modern geology is not necessary to enable a man to determine whether a field is best suited for arable or grazing purposes; nor is it our intention needlessly to employ the scientific appellations which would only puzzle because they are incomprehensible to minds unfamiliar with geological nomenclature. The expression "*a sandy soil*," is well understood; but let it never be applied to any soil that does not contain at least three parts out of four of sand. Then, again, sandy soils that effervesce or give off carbonic acid, or fixed air, when vinegar or vitriol is poured upon them, should be distinguished by the name of "*sandy limestone soils*," to mark them from sandy soils that contain silex or the earth of flint. The term "*clayey soil*," should not be applied to any land which contains less than one-sixth of an earthy matter not effervescing with acids; while the word "*loam*" should be limited to such soils as contain one-third of a smooth earthy matter, *considerably* effervescing with acids. A soil to be considered "*peaty*" ought to contain at least one-half of vegetable matter.

Soils perform at least *three* functions in reference to vegetation. They serve as a basis in which plants may fix their roots and sustain themselves in the erect position—they are the medium through which the greater part of the inorganic matter of vegetables is supplied to them during their growth—and they allow many chemical changes to take place that are essential to a right preparation of the various kinds of food which are yielded to the growing plant.

The best NATURAL SOILS are those whence the materials have been derived from the breaking up and decomposition, not of one stratum or layer, but of many—divided minutely by air and water, and minutely blended together: and in improving soils by artificial additions, the farmer cannot do better than imitate the processes of nature.

We have spoken of soils as consisting mostly of *sand*, *lime*, and *clay*, with certain saline and organic substances in smaller and varying proportions; but the examination of the ashes of plants shows that a *fertile* soil must of necessity contain an appreciable quantity of at least *eleven* different substances, which in most cases exist in greater or less relative abundance in the ash of cultivated plants; and of these the *proportions* are not by any means immaterial. The labor requisite for the permanent improvement of land is repaid by correspondent advantage: the materials for the necessary adjustment are seldom far distant. If coarse sand be requisite, it is mostly or often found immediately over the chalky soil that needs it; and beds of sand and gravel are common below clay. Capital laid out in this way, secures for ever the productiveness and consequent value of the land.

In ascertaining the composition of barren soils with a view to their productiveness, or of partially unproductive land, in order to its amendment, they should be compared with fertile soils in the same neighborhood, and in similar situations; as the difference of composition will, in most cases, indicate the proper methods of improvement. For instance, if on washing a portion of sterile soil it be found to contain largely any salt of iron, or any acid matter, it may be ameliorated with quicklime, which removes the sourness, or, in other words, combines with and neutralizes the acid. For though pure fresh burnt caustic lime is injurious to vegetation, yet in combination with acids (as in chalk) it proves eminently serviceable. A soil, apparently of good texture, was put into the hands of Sir Humphrey Davy, said to be remarkable for its unfitness for agricultural purposes ; he found it contained sulphate of iron, or green copperas, and offered the obvious remedy of top-dressing with lime, which decomposes the sulphate. So if there be an excess of lime, in any form, in the soil, it may be removed by the application of sand or clay. Soils too abundant in sand are benefitted by the use of clay or marl, or vegetable matter. To a field of light sand that had been much burnt up by a hot summer, the application of peat was recommended as a top-dressing; it was attended not only with immediate advantage, but the good effects were permanent. A deficiency of vegetable or animal matter is easily discoverable, and may as easily be supplied by manure. On the other hand, an excess of *vegetable* matter may be removed by paring and burning, or by the application of *earthy* materials. The effect of paring and burning is easily understood. The matted sods consist of a mixture of much vegetable with a comparatively small quantity of earthy matter ; when these are burned, only the *ash* of the plant is left, intimately mixed with the calcined earth. To strew this mixture over the *exposed* soil is much the same as dressing it with peat or wood-ashes, the beneficial effects of which upon vegetation are almost universally recognised. From what has been already said, it will be easily evident, that the beneficial effect of the burnt ash is chiefly owing to the ready supply of *inorganic* and saline material it yields to the seeds which may afterwards be scattered there ; besides which, the roots of weeds and poorer grasses, if not exterminated by the paring, are so far injured as to lead to their death and subsequent decomposition.

The improvement of *peats* or *bogs*, or marsh lands, must be preceded by DRAINING, stagnant water being injurious to all the nutritive classes of plants. Soft black peats, when drained, are often made productive by the mere application of sand or clay as a top-dressing. *The first step to be taken, in order to increase the fertility of nearly all the improvable lands in Great Britain is to* DRAIN *them.* So long as they remain *wet* they will continue to be *cold.* Where too much water is present in the soil, that food of the plant which the soil supplies is so much diluted and weakened that the plant is of necessity scantily nourished. By the removal of the superfluous water, the soil crumbles, becomes less stiff and tenacious, air and warmth gain ready access to the roots of the growing plant ; the access of air (and consequently of the carbonic acid which the atmosphere freely supplies) being an essential element in the healthy growth of the most important vegetable productions. Every one knows, that when water is applied to the bottom of a flower-pot full of soil, it will gradually find its way to the surface however light that soil may be ; so in sandy soils or sub-soils in the open field.

If water abound at the depth of a few feet, or if it so abound at certain seasons of the year, such water will rise to the surface; and as the sun's heat causes it to dry off, more water will rise to supply its place. This attraction from beneath will always go on most strongly when the air is dry and warm, and so a double mischief will ensue: the soil will be kept cold and wet; and instead of a free passage of air downwards about the growing roots, there will be established a constant current of water upwards. Of course, the remedy for all this is an *efficient system of drainage.*

In general, the soils which are made up of the most various materials are those called *alluvial*, which have been formed from the depositions of floods and rivers. Many of these are extremely fertile. Soils consist of two parts; of an *organic* part, which can readily be burned away when the surface-soil is heated to redness; and of an *inorganic* part, which remains fixed in the fire, consisting of earthy and saline substances; from which, if carbonic acid, or any elastic gas be present, it may, however, be driven by the heat. The *organic* part of soils is derived chiefly from the remains of vegetables and animals which have lived and died in and upon the soil, which have been spread over it by rivers and rains, or which have been added by the industry of man for the purposes of increased fertility.

This *organic* part varies much in quantity, as well as quality, in different soils. In peaty soils it is very abundant, as well as in some rich long cultivated lands. In general, it rarely amounts to one-fourth, or 25 per cent., even in our best arable lands. Good wheat soils contain often as little as eight parts in the hundred of organic animal or vegetable matter: oats and rye will grow in a soil containing only 1½ per cent.; and barley when only two or three parts per cent. are present. In very old pasture-lands, and in gardens, vegetable matter occasionally accumulates so as to be injurious, and overload the upper soil. This decaying vegetable, or animal matter, is the "humus" previously adverted to, and incorrectly supposed, before our day, to afford almost the sole *nutriment* essentially necessary to growing plants. That living plants derive from the remains of their decayed predecessors the advantage of being placed in contact with the *inorganic* or saline materials those plants once contained, is not to be denied. But unless the whole crop were ploughed in, every year, this quantity would be exceedingly minute. The true value of green crops ploughed into the soil, or of decaying vegetable matter, the "humus" of former writers, is the formation of *carbonic acid* by the combination of decomposed carbonaceous or woody fibre with atmospheric oxygen; thus supplying to the new and young roots carbon in a form susceptible of being taken up by them.

The *inorganic* portion of any given soil is again divisible into two portions—namely, that part which is *soluble* in water, and, therefore, in a state easily susceptible of being taken up by the vessels of a growing vegetable, and of a further and much more bulky portion which is *insoluble* in water. The *soluble* portion consists of *saline* substances—the *insoluble*, of *earthy* materials.

A *single grain* of saline matter in every pound of a soil a foot deep, is equal to 500 pounds in every acre, which is more than is carried off from the land in the course of forty years, supposing that the wheat and barley are sent to market, and the straw and green crops are regularly returned to the soil in the shape of manure.

Sprengel, a German chemist, now at the head of the Prussian agricultural school, whose own taste, as well as his professional duty, have long directed his attention to scientific cultivation of the soil—has published an exact analysis of two varieties of *productive* soil, of which the following is an abstract:

The first is a very fertile alluvial soil from East Friesland, formerly overflowed by the sea, but for sixty years cultivated with corn and pulse *without manure.*

The second is a fertile soil near Gottingen, which produces excellent crops of clover, pulse, rape, potatoes, and turnips; the two last more especially *when matured with gypsum.*

One thousand parts of each of these soils, after washing, gave—

	No. 1.	No. 2.
Soluble saline matter, - - - - - - -	18	1
Fine earthy and organic matter, (clay,) - - -	937	839
Siliceous sand, - - - - - - - -	45	160
	1000	1000

The most striking distinction presented by these numbers is the large quantity of *saline* matter in the first variety. It consisted of common salt, muriate of potash, the sulphates of potash, gypsum, magnesia, and iron, with phosphate of soda, and other salts. The presence of this comparatively large quantity of these different saline substances, originally derived, no doubt, in great part from the sea, was probably one reason why it could be so long cropped *without manure.* Its composition illustrates the truth of the statement, that a considerable supply of ALL the species of inorganic materials is necessary to render a soil eminently fertile. Not only does this soil contain a comparatively large quantity of the soluble saline matters above enumerated, but it contains also 10 per cent. of *organic* matter, and some lime. The potash and soda, and the several acids, are also present in sufficient abundance.

In the second instance, a fertile soil, but which *could not dispense with manure*, there is *little soluble matter;* and in the insoluble portion, only traces of potash, soda, and the important acids. It contains, also, 5 per cent. of organic matter, and 2 per cent. of lime, which smaller proportions, together with the *deficiency of alkalies*, remove this soil from the most *naturally* fertile class, to that class which is susceptible in hands of ordinary skill, of being *brought to*, and *kept in* a very productive condition.

Sir Humphrey Davy examined some *productive* soils, which were very different in their composition.

We will state the analysis of a few of them.

Soil from Holkham, Norfolk, described as a "*good turnip soil,*" contained 8 parts out of 9 of *siliceous sand;* that is, sand with flint earth, or silex: the remaining 1-9th part consisted in every 100 grains, of—

Carbonate of lime, (chalk,)	63	grains.
Pure silex,	15	"
Pure alumini, or the earth of clay,	11	"
Oxide (rust) of iron,	3	"
Vegetable, and other saline matter,	5	"
Moisture and loss,	3	"
	100	

Thus the whole amount of *organic* matter in this instance is only 1 part in 200, or one-half per cent.; a fact which, in itself, would demonstrate the fallacy of supposing that decomposed animal and vegetable matter in the soil form the exclusive supply to growing plants.

In another instance, soil was taken from a field in Sussex, remarkable for its growth of flourishing oak trees. It consisted of 6 parts of sand, and 1 part of clay and finely-divided matter. One hundred grains of it yielded, in chemical language—

Of silica, (or silex,)	54	grains.
Of alumina,	28	"
Carbonate of lime,	3	"
Oxide of iron,	5	"
Vegetable matter in a state of decomposition,	4	"
Moisture and loss,	6	"
	100	

To *wheat soils*, the attention of the practical farmer will be most strongly directed. An EXCELLENT wheat soil from West Drayton, in Middlesex, yielded 3 parts in 5 of siliceous sand; and the remaining two parts consisted of carbonate of lime, silex, alumina, and a minute proportion of decomposing animal and vegetable remains.

Of these soils, the last was by far the most, and the first, the least coherent in texture. In all cases, the constituent parts of the soil which give tenacity and stiffness, are the finely-divided portions; and they possess this quality in proportion to the quantity of alumina (or earth of clay) they contain. A small quantity of this finely-divided matter is sufficient to fit a soil for the growth of turnips, or of barley, as turnips will grow (though it is not to be expected they will thrive) on a soil containing 11 parts out of 12 of sand. Sand in much greater proportion, or rather disproportion, produces sterility. So pure alumina, or pure silex, pure chalk, or magnesia, are incapable of supporting vegetation; and no soil is fertile that contains 19 parts out of 20 of *any* one of the materials that have been mentioned.

Sprengle gives also the analysis of an *unproductive* soil from Luneburg. It contained, in 1000 parts—

Soluble saline matter,	1	part.
Fine earthy and organic matter, (clay)	599	parts.
Siliceous sand,	400	"
	1000	

This unfruitful soil, compared with the analysis given of the other two on a previous page, will be found to be the lightest of the three, containing 40 per cent. of sand. But this alone is not enough to account for its barrenness,—many light soils containing a *larger* proportion of sand, are yet sufficiently fertile. One thousand parts of its fine earthy matter contain 40 of organic matter instead of 97,—778 of silica instead of 648,—91 of alumina instead of 57,—4 of lime instead of 59,—1 of magnesia instead of 10,—81 of oxide of iron instead of 61 ; while potash, soda, ammonia, chlorine, sulphuric acid, phosphoric acid, carbonic acid, are entirely wanting; such being the ingredients and quantities in 1000 parts of the finer portion of the *very fertile* soil from East Friesland. The oxide of iron is *in excess* in the Luneburg barren soil; there requires, therefore, to be added, not only those substances of which it is destitute, but such other matters as shall prevent the injurious effects of the excessive proportion of iron. This illustration may serve to aid the practical farmer in comprehending how far exact chemical analysis is fitted to throw light upon the capabilities of soils, and to *direct* agricultural practice. The *constitution* of a *soil*, like the *constitution* of a *horse*, or a human being, requires to be known and understood, if we would prescribe otherwise than at random, expensively, unprofitably, or injuriously, either for the diseases of the one, or for the deficiencies of the other.

The *varying* power of soils to absorb and retain water from the air, is much connected with their fertility. Sir Humphrey Davy has remarked upon this; and connecting his statement with the fact, that rain-water always contains ammonia, and, consequently, *nitrogen*, (as one of the elements of ammonia,) we can easily understand why it should be so. He observes, that " the soils which are most efficient in supplying a plant with water by absorption and retention from the atmosphere, are those in which there is a due mixture of *sand*, finely divided *clay* and *chalk*, with some animal and vegetable matter; and yet so loose and light, as to allow the action of the air beneath the surface." Sand in excess destroys the requisite stiffness of the soil, but gives little absorbent power.

The *absorbent* power of land is always greatest on the *most fertile* soils, thus affording one ready test of productiveness. One thousand grains of soil, rendered perfectly dry by exposure to heat equal to that of boiling water, ought, by exposure to air, saturated with moisture, to gain in weight, at least 18 grains, or one-fiftieth ; so that the standard of fertility of soils for different plants must vary with the *climate*, (as well as the varying constitution of the soil itself,) and be particularly influenced by the *quantity* of *rain* that falls upon it. The power of soils to absorb moisture ought to be much greater in warm or dry countries, than in cold, marshy places; and the quantity of clay they contain, greater. The inference is obvious; if deficient, it ought to be added. Soils, also, on the slope of a hill, ought to be more absorbent than in plains, or in the bottom of valleys. Their productiveness is also much influenced by the nature of the sub-soil on which they rest; for, when soils are immediately situated upon a bed of rock or stone, they dry sooner by the sun's agency, than when the sub-soil is clay or marl. A prime cause of the fertility of the land in the *moist* climate of Ireland is, that happily the surface-soil rests upon a rocky substratum. A clay sub-soil will sometimes be of material advantage to a sandy upper-soil, inasmuch as it will retain the necessary moisture in such a manner as to be capable of supplying that lost by the earth above in consequence of evaporation. In the same way, a sandy or gravelly subsoil often corrects the imperfection of *too great* a degree of absorbent power in the true soil.

In devoting the different parts of an estate to the necessary crops, it is perfectly evident that *no general principle* can be laid down, except when all the circumstances of the nature, composition, and situation of the soil and sub-soil are accurately known.

Whatever be the specific variety of the surface-soil, it will, of necessity, take its character from the prevalent substratum. In limestone countries, where the surface is a species of marl, the soil is often found only a few inches above the limestone, and its fertility is not impaired by the nearness of the rock: though, in a less absorbent soil, this situation would occasion barrenness; and the sandstone and limestone hills in Derbyshire and North Wales may be easily distinguished at a distance in summer by the different tints of their vegetation. The grass on the sandstone hills usually appears brown and parched, that on the limestone hills flourishing and green

Each locality will continue to present to the agriculturist facilities for the cultivation of such vegetables as it is best fitted to raise, and for an indefinite period; that is, until the exhaustion of its saline materials, its capability will continue. In clayey soils, it will continue longest; because, as previously explained, *all clays contain potash* and *soda*. But even these in time are exhausted. Air, water, and the changing temperature of the seasons, are at the same time preparing a remedy for the coming deficiency. Fresh surfaces of broken, crumbling rock are in a state of continual formation, exposing to the elements the saline treasures they contain. A period will arrive in the history of all soils, when, *if their saline constituents are not artificially replaced*, it will be necessary, either by deep ploughing, or other mechanical modes of breaking up and exposing the rock from which that soil has been formed, to obtain a fresh supply of soluble alkalies. When the surface of a granite rock has been long subjected to the action of air and water, the lime and the potash it contains are acted on by both; the felspar, mica, and quartz, of which that rock is compounded, are decomposed. The felspar, which is, as it were, the cement of the stone, forms a fine *clay;* the mica, partially decomposed, mixes with it as *sand;* and the undecomposed quartz appears as gravel, or coarse sand, of different degrees of fineness. Then, as soon as the smallest layer of earth is formed in this way, the seeds of mosses, and other imperfect vegetables constantly floating in the atmosphere, and which have made that spot their resting-place, begins to vegetate: their annual reproduction and death furnishes a certain quantity of organizable matter, which mixes with the earthy materials of the rock. In this improved soil, more perfect plants are capable of subsisting, the gradual process being, in truth, an epitome of the world's original creation. Fossil geology shows us that such was the process; and that not until a soil was formed by the decay of redds and mosses, was the earth's surface fitted to rear the stately oak. With every fresh disintegration of the surface, successive quantities of alkaline materials are presented to the growing vegetable.

CHAPTER XII.

Of the Chemical Analysis of Soils, and how far this is practicable by the Farmer.

Enough has been already written to show what is essential to the production of heavy crops, and to prove that a naturally good soil can be forced, or an inferior soil amended, only by the addition of such substances as are really requisite in each particular instance; such adaptation, of course, pre-supposing an exact acquaintance with the nature of the land.

But the practical farmer will anticipate the inquiry, How am I to arrive at this knowledge? I am no chemist: I can form some general notion of the composition of the soil which I cultivate; and, from experiments, (some of which have been fortunate, others confessedly expensive and unproductive,) I am enabled to say what seems to agree best with it. Is it necessary to employ a scientific chemist to analyze my wheat soils, or are the means of discovery within my own power?

In reply to such very natural inquiries,—to a certain extent, the means of analysis are within the reach of every working man.—Nevertheless it is perfectly true, that the management and tilling of the soil is a branch of practical chemistry; and like the arts of dyeing, calico printing, or the smelting of metals, it may advance to a certain degree of perfection,—its present condition, (which has been stationary and imperfect for many centuries,)—without the aid of science; but it can only have its processes explained, and be led on to *shorter*, more *economical*, more *productive*, and *perfect* processes, by the aid of scientific principles.

From the analysis of Davy and Sprengel, already given, of soils known to be eminently productive, (and two or three such illustrations are as good as a thousand,) it is not difficult to say of what materials a good wheat soil *ought* to consist. It is impossible to compare any given soil with these standards, unless we have a similar examination instituted; and if it can be obtained from the hands of an able investigator, it is always very desirable, so much so as amply to repay the trifling expense. Chemistry has rendered many and great services to agriculture, and can render more: the two sciences ought not to be considered as having no relation to each other; on the contrary, practical farming is only conducted on *rational* principles when directed by chemical science. Hitherto, it has fallen in with the humor or bias of only a few scientific men to enter upon such inquiries. Sir Humphrey Davy, the greatest chemist of his age, devoted his efforts not only laboriously, but most usefully, to the prosecution of agricultural chemistry; and the recent views and discoveries of Liebeg, will do much to *economize* agricultural operations, as well as to direct the farmer to the easiest and shortest modes of doubling his crops. But generally, the appreciation of such efforts, on the part of learned men, has been so small—the reception of scientific results and suggestions by the farmers, so ungracious, that little wonder can exist that so many have quitted the field in disgust—that the majority of able chemists should studiously avoid it. Hence it has happened that in England, the analysis of soils has rarely been undertaken, except as a matter of professional business. Exact chemical analysis is a difficult art, one which demands much knowledge and skill in practice. It calls for both time and perseverance, if valuable, trustworthy, and *minutely correct* results are to be obtained. But it is only by aiming after such *minutely correct* results that chemistry is likely to throw light on the peculiar properties of those soils, which, while they possess much general similarity in appearance, are yet found, in practice, to possess very different agricultural capabilities.

Sir Humphrey Davy has given, with his usual precision, very copious directions for the analysis of soils. But we have no hesitation in affirming, that few practical farmers are likely to attempt the task. Not that the requisite instruments are either numerous or expensive, but that some familiarity with chemical operations is necessary; and that little dependence could be placed upon results which, if incorrect, would mislead perhaps more widely than the merest guesses. Fortunately there are to be found men of ability in sufficient numbers to supply the requisite information; and there is nothing more inconsistent in soliciting from a practical chemist a statement as to the actual composition of a given portion of soil, with a view to the supply of its deficiencies, than there is in employing a veterinary surgeon not only to give an opinion as to the nature of the ailment of a horse, but to advise the appropriate remedy.

Undoubtedly, the utility and necessity of such interference or assistance may sound strangely—grate harshly upon the long-established usages of that class of English farmers with whom, unfortunately, mere *exertion* is a virtue, and skill or science a presumed apology for laziness. It would appear, however, that in some agricultural districts, a spirit in most rational conformity with such combinations of science with mere brute labor, is beginning to prevail. Early in the present year, a meeting of landed gentry and farmers took place in Edinburgh, for the express purpose of forming an association *for the application of chemistry to agriculture;* a tolerably expressive indication of the state of public feeling in Scotland, and one that, we trust, will be followed up by the organization of kindred institutions throughout the entire kingdom. The great and leading object of the association is to have a chemist of first-rate eminence, resident in Edinburgh, who, during the winter months, shall devote himself to analyzing such soils, manures, and other substances as may be sent him by farmers, and giving them advice regarding their value and usefulness. In summer he will visit different districts of the country, at the request of members of the association, and give a few lectures in the towns, or advice to individuals, regarding the system of management best suited to different soils. It is easy to see that all this will be attended with very great practical benefits to the country.

We are aware, however, that there are persons who have a distrust of the aid to be had from chemistry in the delicate and refined processes of agriculture; and to them we would address a few words.

Now, the more recondite principles of vegetation are subjects on which neither chemist nor farmer will require to touch. Indeed, *there will be no call made on the farmers, or persons wishing the analysis, for any chemical knowledge.* They are to submit limestones, bone-dust, guano, and manures of all kinds, marls, decaying rocks, and such like substances, to the chemist, and he is to pronounce on their value, and to point out their utility in reference to different soils, and for raising different crops. He will say, for example, whether the guano has been robbed of its ammonia, or the bone-dust of its gelatine, or whether the limestone be colored with bituminous matter which will disappear with burning, or with iron which will not; and then he will be able to say what price the article ought to bear, and with what crops, on what soils, and at what periods it ought to be used. On the part of the person who sends the substance for analysis, it is plain that no knowledge of chemistry is required; and even the chemist will not find his duty an arduous one. A few chemical tests, and an accurate balance, will be nearly all that he will require; and he will have no occasion to approach those nice and subtle operations of nature, over which there certainly hangs a delicate and almost impenetrable veil.

But the summer duties of the chemist will be even more important than the analysis which are to occupy his winter hours. During that season he will impart information on many of the more recent discoveries and improvements in practical agriculture; and already enough has been done to admit of his giving much valuable and curious information, whether in the form of lectures, or by communicating with individuals. For example, the good effects of bone-dust, and of the phosphates generally, on peaty soils—of saline compounds for crops of hay on loams in trap districts—and of lime on granitic soils—may be mentioned, and they admit of explanation. They are noticed here as a proof of the advancement already made in this kind of knowledge. But much yet remains to be done; and besides giving information, it will be his duty no less to suggest experiments. He will give instructions to farmers to make trial of substances, *the composition of which is known and determinate*, on different soils, and with a variety of crops, accurately noting the weight of the produce, both in its dry and moist state. And who does not see that such trials, made on a diversity of soils, (for in this respect the experiments will have the advantage over any which the chemist could make himself on an experimental farm,) will furnish him with results from which he may possibly draw some general principle. This, again may point the way to other trials and new discoveries; and so on without limit.

Need we say what will be the benefits of all this training and experiment? In the first place, there will be a gain to the country at large in the increased productiveness of the land; and those will be the first to share in it who first know of the new methods that will give them crops at a lower cost than their neighbors. And, in the second place, a spirit of intelligence and inquiry cannot fail to be diffused among our farmers, of which it will be difficult to estimate the value. Instead of blindly following in the old courses, they will have a pleasure in devising new ones, and will gradually raise themselves in the scale of being. And if it be true that even the mechanical arts will fall off, as De Tocqueville has admirably shown, if their principles are lost sight of, just as copies taken from copies decline at last from the original, much more will the fields of the farmer, changing in their composition with every crop that is taken from them, reward none at last but the intelligent and the skilful.

CONTENTS.*

Author's Introductory, ... PAGE 3

Productive Farming,—By J. Smith, ... 17

Chapter I.—Introductory Observations on Modern Agriculture, . . 19

Chapter II.—Some Account of the Simple or Elementary Bodies found in Animals, Plants and Soils, ... 28

Chapter III.—Plants and Animals are both alike endowed with Life; the Elementary Materials and many of the Proximate Principles of Animal and Vegetable matter are precisely identical—they have similar Organs essential to their growth and reproduction, and are nourished or destroyed by the same agencies, ... 35

Chapter IV.—Of the Elementary Composition of Water; of the Composition of the Atmosphere; and of the Artificial Application of Water to Grass Lands, . . . 49

Chapter V.—Of the Nature of Vegetable Growth; the true use of Vegetable Mould or Humus; and of the Sources of the Elementary Constituents of Plants, . . . 53

Chapter VI.—Of the Sources of the Saline, Earthy, and other Unorganized Constituents of Vegetables, . . . 67

Chapter VII.—Of the necessary Relation between the Composition of a Soil and the Vegetables it is fitted to raise. Fallowing and Green Crops considered as Vegetable Manure, 70

Chapter VIII.—Of the Nature and correct Use of the Excrements of Animals considered as Manure; the Mode of its Action and Preservation.—Bone Dust and Dead Animal Matter, ... 77

Chapter IX.—Of the comparative Value of Vegetable Manure, as contrasted with Animal Excrements, ... 90

Chapter X.—Of Manures of Mineral Origin, or Fossil and Artificial Chemical Manures; their Preparation, and the Manner in which they act.—Of Lime in its different States; its Operation as a Manure.—Of Alkalies and Common Salt, as to their Action upon the Land, . 92

Chapter XI.—Of the Composition of Productive Soils, and of the Agency of the Elements in their Natural Formation from the Rocks upon which they rest, . . . 99

Chapter XII.—Of the Chemical Analysis of Soils, and how far this is practicable by the Farmer, ... 107

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* After the introductory remarks were printed—in which it is intimated that "no table of contents will be given,"—it was thought that it would be useful to add to each section a reference to the contents of the same, which will enable the reader to turn to the different heads with facility.

THE FARMER'S MANUAL,

A PRACTICAL TREATISE ON THE NATURE AND VALUE OF MANURES, FOUNDED FROM EXPERIMENTS OF VARIOUS CROPS, WITH A BRIEF ACCOUNT OF THE MOST RECENT DISCOVERIES IN AGRICULTURAL CHEMISTRY.

BY F. FALKNER, ESQ.

To increase the quantity, and preserve the fertilizing properties of farm-yard manure by skilful management, and to provide *efficient* substitutes from every available source, are objects so deeply interesting to the agriculturist, and important to the public welfare, as to require no argument to enforce attention. These objects, however, cannot be attained to their fullest extent without some knowledge of the nature and properties of those individual substances of which manures consist—of the elements, or principles which enter into their composition—and the laws by which they are governed. The unskilful management and application of farm-yard dung—the many valuable sources of fertilizing substances which are overlooked or neglected, and the confused notions which generally prevail with regard to artificial manures—are a continual cause of very severe disappointment and loss: all bearing testimony to the want of a more extensive diffusion of such knowledge.

It is the object of the present treatise to explain the nature and constitution of manures generally,—to point out the means of augmenting the quantity, and preserving the fertilizing power of farm-yard manure,—the various sources of mineral and other artificial manures, and the causes of their frequent failure.

☞ The following section, it will be observed, was also written in England but this circumstance we do not consider as in any degree lessening its value.—Acquaintance with the true principles of Agriculture in that country is, at present, far in advance of the United States. Their proximity to other sections of Europe, where the science has been brought to its highest practical bearing, and the unsparing liberality with which means are employed to gain knowledge, has secured the British husbandman advantages not yet enjoyed in this country, but which *may be*, very speedily, if the American Farmers can be induced to appreciate the lessons of instruction offered them by their brethren on the other side of the ocean. The author of the following treatise undoubtedly understands the subject thoroughly, and his essay, we are of opinion, will be found to present as clear and accurate information and direction to the Farmer, in an essential branch of his profession, as is any where to be found. The *introductory* chapter to this treatise is omitted in the following reprint, for the reason that the information it conveys has been already abundantly and more elaborately furnished in the preceding section.—The author very justly remarks, that "If it be our desire to obtain the utmost possible benefit which the exercise of our control over the operations of nature is capable of producing, it is indispensable that we should first know the *character of the materials* which she employs, and the laws to which they are subject. Without such information all practice must be merely experimental, and experiments can afford no certain guide to their real effects unless we are acquainted with all the conditions under which they have been made. To understand, therefore, the best method of managing and applying farm-yard manure, it is needful to commence with obtaining some knowledge of the elements or materials of which it is formed." The nature of the *Elements* of which the whole surface of the earth is composed, and the Plants that grow upon it, is well explained in the pages which it is presumed the reader either has already or will not fail to read and make himself familiar with, as indispensable to a proper understanding of what follows.

PART I.

ANIMAL AND VEGETABLE MANURE.

CHAPTER I.

General Composition of Farm-Yard Dung.

In a general view, FARM-YARD MANURE consists of refuse straw, hay, chaff, and grass, and of the dung and urine of animals which are fed in the sheds and stables of the yard.

Straw consists of carbon, oxygen, and hydrogen; the two latter in the proportions which constitute water, with some portion of nitrogen, and of earthy and alkaline salts. It has been before stated, that the three first elements are abundantly supplied to the growing plants by the atmosphere, and that, therefore, ammonia and the earthy and alkaline salts are the most valuable parts as manure. The value, however, of the combustible part of straw is by no means inconsiderable, as it serves, in the undecayed state, to receive and retain the urine of animals; and, when placed on the ground, attracts moisture from the air, which it supplies to the roots of plants. By its decomposition, it increases the temperature of the soil; and, at the same time, yields carbonic acid gas to the roots of plants, before their leaves are sufficiently expanded to enable them to derive that substance from the atmosphere. Dry straw, when burnt, yields about 5 per cent. of ashes. Professor Johnson gives the following analysis of 100 parts of the *ashes of straw* of different kinds:—

	Wheat Straw.	Barley Straw.	Oat Straw.
Potash, - - - - -	½	3½	15
Soda, - - - - - -	¾	1	00
Lime, - - - - - -	7	10½	2¾
Magnesia, - - - - -	1	1½	½
Alumina, - - - - -	2¾	3	00
Oxide of Iron, - - - -	00	½	00
Silica or flint, - - - -	81	73½	80
Sulphuric acid, - - - -	1	2	1½
Phosphoric acid, - - - -	5	3	¼
Chlorine, - - - - -	1	1½	00
	100	100	106

The *alkalies and earths* are united with the carbonic and mineral acids as salts, the former of which the Professor has not stated. Some of these salts are soluble, but the larger part are insoluble. The soluble part of the ashes of wheat straw is about 9 per cent.

The ashes of the corn of the several kinds consists of the same salts, except that they contain a much larger portion of potash and soda. The Professor observes, that "plants may leave the same weight of ashes when burned, and yet the nature of the ashes be very different: the ash of one may contain much lime; of another much potash; of a third much soda; while in a fourth much silica may be present." Thus 100 pounds weight of the ashes of bean straw contains 53½ pounds of potash, while that of barley straw contains only 3½ pounds in the 100. On the other hand, the same weight of the ashes of the latter contains 73½ pounds of silica, while those of the bean straw produce only 7½ pounds. The different kinds of chaff produce similar ashes to the straw, but always contain a greater portion of silica. It should, however, have been observed, that straw of different kinds yield only a very small quantity of nourishing matter to cattle.

Grass and hay contain in their combustible substances a very considerable portion of nourishing matter in the shape of sugar, starch, and compounds containing nitrogen, to the presence of which, and particularly the latter, hay owes its superior effect as fodder. The saline and earthy portions correspond nearly with those of straw, but are much more abundant, and produce similar effects as manure.

The following *analysis of hay* is given by Professor Liebig:—116 parts of hay dried in the air produced 100 parts when dried at the heat of boiling water. The 100 parts so dried consisted of

Carbon,	45.8
Hydrogen,	5.0
Oxygen,	38.7
Nitrogen,	1.5
Ashes,	9.0
	100.0

The *salts* which are constantly found in the *ashes of plants* must be essential to their growth; and it may be easily conceived that as they abound in a soil, it will become more fertile. From the different proportions in which we have seen they abound in plants, it may also be readily understood how a soil may be more favorable to the growth of one plant than to another; and also why a soil which may be favorable to the growth of straw will not produce much grain—owing to the deficiency of potash to supply the demand of the latter. Such is the efficacy of ashes as a manure for meadow-land, that in Germany, according to Professor Liebig, no other kind of dressing is applied, and by their means alone, the most abundant crops of grass are obtained.

The extensive foliage of the grasses, and particularly of the trefoils, obtains from the air all the carbon and nitrogen to form, with the elements of water, the nourishing substances they yield. The importance of the earthy parts of plants will be the better appreciated when it is known as a fact, reported by the highest chemical authority, that in certain situations the bones of cattle and horses are very defective in solidity and strength, owing to the deficiency of *bone earth*, one of the principal constituents of ashes. It is highly probable that a similar deficiency in our dairy pastures might, in many situations, have an effect in affecting the quality, if not the quantity, of milk, which always contains phosphate of lime and magnesia in considerable quantity.

CHAPTER II.

Combustion and Decay of Plants—Consequences of the excessive Fermentation and negligent Management of Farm-yard Dung—Causes of Sterility—Means of increasing the quantity of Manure.

We have already said that plants in a dry state, such as straw, hay, &c., consist of carbon, hydrogen, and oxygen; a very small portion of nitrogen, and of about six parts in 100 of alkaline and earthy salts; and that the former elements are placed, by the operation of the vital principle, under a different arrangement with regard to each other from that which their chemical affinities give them a tendency to assume.

The combustion or burning of vegetable substances is nothing more than a rapid and violent action of those affinities or attractions, in which oxygen plays the principal part. When they are heated to a certain degree, both the oxygen of the air and that already contained in the substance are brought into action, and the result will be easily understood from what has been previously stated of the nature of the elements concerned. The oxygen unites with the carbon to form carbonic acid gas, and with the hydrogen to form water, while a small portion of the hydrogen unites with nitrogen to form ammonia, or (though subject to some doubt) passes off uncombined. Carbonic acid gas is the most abundant of these products, water the next in quantity, and ammonia by far the least. These all escape as gases, and the ashes that remain consist of some or all of the oxides, or bases, before described, united with some or other of the mineral acids—as alkaline and earthy salts, which differ very much, both in kind and quantity, according to the plants from which they are derived. As these salts, or mineral substances constitute an essential part of all plants, they are themselves capable of acting powerfully as manure. The most valuable, and generally the most plentiful of them, are the salts of potash, and the phosphates of lime and magnesia; not that the other salts contained in ashes are less essential; as, for instance, muriate of soda *(common salt)* and sulphate of lime, *(gypsum,)* but because the latter are more liberally supplied to the soil by the hand of nature.

If, instead of being burnt, plants are accumulated in heaps exposed to the weather—as in a dung-yard—a similar action to burning, though of slower operation, takes place; which indeed may be called a tardy combustion, in which the elements of the water present take an active part. The greater portion of the carbon, hydrogen, and oxygen, with nitrogen, are thus dissipated; the sulphates and phosphates are decomposed, producing stinking gases; and if in the mean time water be allowed to soak through the mass and drain away, it carries with it the soluble salts, ultimately leaving a black mass, consisting chiefly of carbon, with a small quantity of hydrogen and oxygen, and some insoluble earthy salts. If, therefore, decay be allowed to proceed to its greatest extent, it produces a much worse effect than absolute fire; inasmuch as almost all the soluble salts are lost. Vegetable matter reduced to this state is *humus*, or that black vegetable matter contained in all rich soils, and those of old pasture land. The only difference is in the mode of their production, the one having been produced by the decay of plants on the surface, and the other from the decay of the roots and leaves of plants both above and beneath the soil. They operate in the same way in the nourishment they yield to plants, namely, by the salts they yet retain, by attracting moisture and ammonia from the atmosphere, and by slowly yielding carbonic acid gas to the roots of the growing crop.

If the quantity of water which mixes with the heap be limited, it is often evaporated by the heat produced by the fermentation; the chemical action in a great measure ceases; and the heap, when opened, exhibits that appearance which is commonly called "*fire fanged*." When in that state, it will be found to have lost more than one-half of its value; but, if due care be taken to regularly mix the layers of dung, without too much intermixture of horse-litter, there will be no danger of the dung made by the cattle in the yards being overheated by fermentation, even in the warmest weather. Should that danger, however be apprehended, an addition of road-scrapings, or earth of any kind, will prevent it; and, in the winter, the cleanings of the cow-house, as being of a cold nature, will answer the purpose.

When plants and their seeds are consumed by animals, nearly half their weight in a dry state is given out from the lungs and by perspiration from the skin in a gaseous form, chiefly as carbonic acid gas and water, with some ammonia; the remainder of their substance, together with the effete, or dead matter, of the animal organs are rejected, as dung and urine, except that portion retained as nourishment by growing and fatting animals. The *solid excrement* contains the woody fibre, the insoluble animal matter and salts, and the *urine*, the more soluble salts and substances, rich in nitrogen. If no care be taken of the urine, and it be allowed to run about the yard, it soon putrefies—its nitrogen flies off in the shape of ammonia; its salts are carried away by every shower of rain; and, although a portion of it may be saved by its mixture with the dung of the cattle, yet the greater part of its valuable contents are evaporated by the action of the atmosphere. If it be allowed to drain into a tank or other receptacle, it there also rapidly undergoes putrefaction; and if this be not checked, a considerable part of the ammonia produced will escape with the sulphur and phosphorus, resulting from the decomposition of the salts containing those substances: occasioning the intolerable stench observed in such cases. Now the ammonia, and the alkaline and earthy salts, are by much the most valuable part of farm-yard or stable dung, and the former is always more abundant when cattle are fed with corn, oil-cake, and other rich food. Without ammonia no seed could be produced; and without alkaline and earthy salts, neither seed nor plants could exist.

It is the deficiency of some of these substances, where moisture is not wanting, which is the cause of the land producing poor crops; and it is the almost total absence of some, or all of them, which is the cause of complete sterility. Instances may almost everywhere be found of land which, though abounding in humus—such as heathy and peaty soils—are, notwithstanding, incapable of bearing grain. If the valuable substances above mentioned be wasted in the manner described—which is too often the case, to an enormous extent—the crops will be very deficient; and if to this waste be added the carrying away of large portions of the produce—as when hay and straw are sold, and no manure returned—the land will soon cease to bear crops. To increase the quantity of manure raised on the land should, therefore, be the constant aim of every farmer: hay should never be sold, unless two tons of stable litter are returned for every load sent off the farm; and, unless the farm contains a large portion of rough pasture, the horse-teams should be kept in the stable, and soiled during the summer and autumn on green food; every portion of apparently refuse vegetable and animal matter should also be carefully collected and added to the dung-heap; and, in this manner, it is inconceivable what additional quantities of excellent muck may be be produced. The manure thus made, and not fermented, is generally applied, either in its fresh state, or only partially turned, to clay land fallows which are to be sown with wheat; as being of a colder nature than winter-made dung, it will not occasion the crop to be so hastily pushed forward as to occasion straw instead of corn.

If attempts be made to supply the place of farm-yard dung by *any one salt*, or, in other words, by two or three only of the elements of plants—nitrate of soda, or nitrate of potash, or sulphate of lime *(gypsum)* for instance—it will succeed only where all the others happen to be present on the soil, by the effect of previous manuring; and will inevitably fail where those other needful substances are either absent or very deficient. Now, it is extremely difficult to ascertain in what salt the soil is really deficient; care must, therefore, be taken in the application of artificial manures, that they contain all the elements included in the muck for which they are substituted. These are all usually found, more or less, in the dung-heap: how needful, therefore, is it that the farmer should take good care of that manure produced upon his own land which certainly contains all the elements of plants, and upon which he knows he can safely rely!

It has been stated before that the most efficient part of farm-yard dung is that small portion invisible in the mass, which consists of earthy and alkaline salts and ammonia. The other ingredients which constitute the great bulk of manure, consisting of carbon and the elements of water, are abundantly supplied by the atmosphere to the growing plants, and therefore a loss of these by needless fermentation or neglect is of little importance, were it not that their loss is unavoidably accompanied with the waste of the more essential substances in the manner described. It should be the object of the farmer not only to prevent the waste of such precious substances by every means that knowledge and ingenuity can devise, but also to make every addition to them that nature or local circumstances have placed within his reach.

These desirable purposes he will be the better able to carry into effect when he fully understands the nature of the manure he has under his management, and by that means he can exercise a sound discretion in adding to its quantity and effect.

Let it not be alleged against any inquiry by the farmer into the constituent nature and chemical properties of his manure, that he has no ideas attached to the several terms used to designate the substances of which it is said to consist. He is obliged to learn the names and uses of the several implements he employs in the cultivation; and, upon what principle, we may ask him, should he refuse to make himself acquainted with the names and general properties of the produce he raises? But little effort is required to obtain a precise knowledge of the several elements, or substances at least, by the employment of which he is enabled to raise and increase his crops, and is it not pleasant to learn, as well as most useful to understand, the reason of their value to him? Nor is this limited degree of chemical knowledge of difficult attainment. Every farmer has seen wood ashes, and also seen water poured upon them for the purpose of extracting a something: that substance is chiefly potash, which may be seen by evaporating the clear water, which leaves the alkali behind, and the dregs which remain at the bottom consist for the most part of earthy phosphates—a similar substance to the earth of bones. *Soda* is now so commonly used as to be known at sight to most persons; *lime* and *magnesia* are still more familiar; *ammonia* is the common pungent salt of smelling-bottles; *sulphuric*, *muriatic*, and *nitric acids*, are extensive articles of commerce, and with *phosphoric acid*, may be found at any chemist's shop, and these acids, as well as their bases—potash, soda, lime, and magnesia—may be had for a trifle, either separately or combined as salts. When, therefore, the appearance and more obvious qualities of these several substances have become familiar, their efficacy as manure may be proved, by mixing them thoroughly with two or three times their weight of mould, and applying the compost to garden plants. The farmer might in this easy way soon become acquainted with the name, character, and properties of the invaluable substance contained invisibly in the muck of his yards; and would be the better able, and more desirous, to prevent their stealing away from him.

We now proceed to explain the nature of farm-yard dung, and of such other substances as are generally used, or occasionally resorted to, as aids or substitutes.

CHAPTER III.

Excrements of Horses—Horned Cattle, Pigs, and Fowls.

The solid excrements of cattle used in agriculture differ considerably in value according to the age and uses of the animals. Young cattle retain the phosphates contained in their food for the increase of their bones; while dairy cows yield the phosphates in their milk: the dung of both these is consequently deficient in such substances, and produces from this cause a less effect as manure. The value, or virtue, of both the solid and liquid excrements, are most materially affected by the food given to cattle. Corn and oil-cake contain a large quantity of phosphates, as well as starch and substances containing nitrogen, and when these are given as food to cattle, they not only thrive rapidly, but their excrements become proportionably rich in phosphates and substances producing ammonia. The flesh or muscles of animals is increased by those parts of plants and seeds which consist of compounds containing nitrogen; and their fat is derived from such as yield starch and sugar. In the case of fatting animals with any given quantity of food, they produce much more both of flesh and fat when kept in a state of repose, and at a moderate temperature, than when exposed to cold and allowed to take exercise. "It is, indeed, known that the vital forces decrease when the body is exposed to a certain degree of cold; and when this is sufficiently intense, that they are either suspended, or altogether annihilated."

Although rather beside our present purpose, we yet cannot refrain from remarking in this place upon that beautiful economy of nature which connects the nutrition and growth of plants with that of animals; by which the inorganic substances essential to the latter are equally so to the former. Thus the phosphates of lime and magnesia, and the sulphate and muriate of soda (*common salt*), potash, and iron—as required by plants—equally subserve the nourishment of animals. Without the former, the bones of animals could not be formed; while phosphoric, sulphuric, and muriatic acids, soda, potash, and iron, are not only necessary to form the substance of animals, but are indispensable to the discharge of the functions of life. In this way, plants may be said to be the caterers of animals, as they collect and concoct the food upon which they subsist. The caseine (or *cheese*), albumen, and fibrin, which have hitherto been considered the production of animal life, are now ascertained to be previously formed by plants, as well as starch and sugar; and are only assimilated and modified by the animal functions. The three first substances have been by the chemist extracted from plants, and their analysis is precisely similar to those yielded by animals.

1000 parts of the *solid excrements of a cow, or ox*, consists of 750 parts of water, and the remainder of the rejected vegetable matter, and some animal substances derived from the waste which the organs of animals are continually undergoing. When 1000 of the *dried* excrement is burnt, it yields 60 parts of ashes, consisting of the following substances:—

Silica	44
Carbonate and phosphate of lime	12
Carbonate, sulphate, and muriate of soda	2
Magnesia, alumina, and potash	2
	60

The solid excrement of cows and oxen is by itself very little prone to undergo putrefaction or fermentation, which is owing to the very small quantity of nitrogen they contain; it, therefore, gives out but little ammonia; but when mixed with urine—which abounds with nitrogen—rapid fermentation ensues, and very pungent fumes of ammonia and other offensive gases escape.

The *urine of horned cattle* consists of a large portion of water, holding in solution a substance called *urea*, which readily changes by fermentation into ammonia; it also contains several salts formed from the various elements already described. The following is an abstract of the analysis of 100,000 parts of the urine of cattle by Professor Sprengel:—

Water	92.624
Urea, with resinous matter	4.000
Albumen and mucus, substances containing nitrogen	200
Salts of potash, soda, and ammonia, with organic acids	862
Sulphates, phosphates, and muriates of soda, lime, and magnesia	747
Ammonia	205
Potash	664
Soda	554
Lime	65
Magnesia	36
Alumina	2
Oxide of iron and manganese	5
Silica	36
	100.000

It is owing to the presence of so much nitrogen in urine that it so rapidly undergoes putrefaction, and promotes that action in vegetable substances in contact with it: as, for instance, in the straw and refuse of the farm-yard. The urea—which abounds in nitrogen—takes an active part in this process, and yields a large quantity of ammonia.

The *solid excrement of horses*—as they generally consume a considerable quantity of corn—contains more nitrogen than that of horned cattle; which accounts for the circumstance of its fermenting much faster than the latter. 100 parts of this excrement consist of 70 water, 20 vegetable fibre, and the remaining 10 parts are composed of animalized matter, earthy and alkaline salts. 1000 parts of the dried solid excrement contain, according to Professor Sprengel, 60 parts, by weight, of ashes, of the following composition:

Carbonate, sulphate, and muriate of soda	5
Carbonate and phosphate of lime	9
Silica	46
	60

Besides these there must be some other earthy substances.

The *urine of horses* is composed of 94 parts in 100 of water; the remaining 6 parts consisting of urea and salts of soda, lime, and potash. Nitrogen is much less abundant in this urine than in that of cows and oxen; which renders the former much less fertilizing than the latter, when applied in a liquid state. Stable dung, however, yields a large quantity of ammonia, most of which is lost to the farmer—as is evident from the strong ammoniacal smell which is constantly emitted in stables; and, more especially, from the heaps generally placed near the door. This escape of ammonia has been alluded to before, in speaking of its principal element—nitrogen; and the injury done to stable walls by the conversion of the mortar into nitrate of lime. The waste of this precious material might be easily prevented by means of strewing the floor of the stable with gypsum powder, by which a sulphate of ammonia would be formed, a substance or salt that is not volatile. The gypsum should be in *fine powder*, or it will fail of producing the desired effect; as some recent experiments have tended to prove. Sulphuric, or muriatic acid, diluted with a large quantity of water, will, however, be much more rapid and effectual.

The *dung of pigs* is generally considered to be a "cold manure;" but this can only be said of that of store pigs, for it must form a powerful manure when pigs are fed upon corn and other food containing much nitrogen. The *urine* contains a large quantity of nitrogen, and becomes exceedingly offensive when allowed to putrefy by itself. The excrements of the pig should, therefore, be constantly carried away along with the litter, and mixed with the other dung of the farm-yard; for if applied by itself to potatoes, or other esculent roots, it is apt to impart to them a most disagreeable flavor: occasioned, probably, by the large quantity of liquid food which they consume, and to some peculiar volatile substance contained in the urine; which, according to an analysis by Professor Sprengel, contains, in 100.000 parts,—

Water	92.600
Urea, with a very little mucus, albumen, and coloring matter	5.640
Salts; as common salt, muriate of potash, gypsum, carbonate of lime, and sulphate of soda	1.760
	100.000

From which analysis, it appears, that the urine of the pig contains rather a smaller proportion of water than the urine of horned cattle, and 1½ per cent. more of urea; and this explains the reason of its being more caustic in its fresh state, than that of cattle.

The *dung of poultry* is a very powerful manure, containing a large proportion both of phosphates and ammonia; for, as they discharge their excrements through the same opening, both the solid and fluid portions are mixed together. When applied as a top-dressing, it has an admirable effect in restoring wheat that has been thinned by slugs, or an unfavorable winter; by means of mixing the dung with ashes, for the purpose of spreading them more regularly. The strongest is that of fowls and pigeons, in consequence of their living chiefly upon grain and insects, while geese maintain themselves mainly upon grass. There is, indeed, considerable prejudice against that of geese; in consequence of the unpleasant effect which it occasions upon the grass of any field on which they may be fed, as evinced by the dislike entertained by other animals which are there pastured. Whether occasioned by uric acid, ammonia, or any unknown cause, the injury is, however, soon recovered; for no sooner does rain fall, than these caustic substances are diluted, and the grass not only loses all taint, but grows more luxuriantly when fed by geese. When employed in a compost, the dung is also unobjectionable; and must have the same effect as guano, which is derived from the dung of birds.

The following observations of Professor Sprengel on the *excrement of sheep* are so valuable and interesting, and the subject so important to every farmer, that we make no apology for quoting them at full length in a separate chapter.

CHAPTER IV.

Dung and Urine of Sheep.

Sheep abstract somewhat more nourishment from their food than neat cattle; for if we first weigh the dry food given them, and afterwards the dry excrements, we shall find that these weigh rather less in proportion with sheep than with cattle. It may, indeed, be supposed, that, in the digestion of sheep, a greater amount of oxygen and hydrogen unite to form water, which accordingly evaporates with drying. Still the stomach, and other digestive organs of sheep, must have the power of abstracting from the food a larger quantity of nourishment than those of cattle; as sheep, in eating, chew their food more minutely. This is the reason why the same food—especially when consisting of hay, straw, or other dried plants—goes further with sheep than with neat cattle; and this is by no means an unimportant circumstance.

The digestive organs of sheep would seem even in some degree to reduce vegetable fibre; which substance passes undigested through the bodies of most other animals, not excepting the human body. Of what incalculably important consequence would it be, if food could be prepared in some cheap manner, so as to render the whole of the vegetable fibre digestible! And that it is capable by chemical means of being brought into such a state, we know by the fact that sugar may be obtained out of paper, which is very pure vegetable fibre. It is a matter of experience that green clover is better food than the hay made from it; the simple reason of which is—that in the process of drying, many of its vegetable particles are so much hardened that the digestive organs have no longer any power to reduce them. By steaming the hay the hardened particles are again softened, and consequently there is always a less portion of such food required than of the dry.

According to Block, the following quantities of excrement arise from different species of fodder given to sheep:—

From 100 lbs. of	rye-straw, fluid and solid,	40 lbs.
"	hay,	42
"	potatoes,	13
"	green clover,	8½
"	oats, dry excrement,	49

In this case, therefore, the same thing happens as with cattle; upwards of one-half of the solid food being lost, whether from straw or any other kind of food—for 100 pounds of green clover give 20 pounds of hay, and 100 pounds of potatoes leave 24 or 25 pounds of solid substance. This loss occurs partly in the formation of water: partly in the carbonic acid of respiration; partly in the production of wool and the formation of flesh and fat; and partly, also, in the last place, in the evolution of ammonia and other perspirable matter through the skin.

The *solid excrements of sheep* have been chemically investigated by Zierl, and this appears to be the only chemical investigation we possess on the subject. 1000 parts, by weight, of the solid excrements of sheep, fed on hay, contained—

Water,	679
Sugar of gall and soluble salts,	34
Bilious, with extractive matter,	19
Humus, with coagulated albumen, and mucus of the intestines,	128
Woody fibre and vegetable remains,	140
	1,000

1000 parts, by weight, of the dry excrement, give, on being burnt, 96 parts of ashes, consisting of—

Carbonate, muriate, and sulphate of soda,	61
Carbonate and phosphate of lime,	20
Silica,	60
	96

He has undoubtedly overlooked magnesia, potash, alumina, oxide of iron, and oxide of manganese, as all these substances occur in the hay which the sheep had eaten; but we might take for granted that the whole of the potash of the hay would pass off in the urine.

The chemical component parts of the solid excrements of sheep, as well as of all other excrements of animals, depend naturally on the food the animals eat; and they are so much the better, or worse, in their effects as manure, as the food itself is stronger or poorer.

Solid sheep-dung contains somewhat less water than the solid excrement of cattle; a circumstance which the appearance alone of the sheep-dung, being less soft and pulpy, would have led us to expect. It possesses, on the other hand, more of the easily decomposable substances containing nitrogen; for while the solid excrement of cattle in 1000 parts by weight contains only 105 and 112 of this and other substances that are quickly decomposed, that of the sheep contains no less than 180 parts. If, also, we consider that sheep-dung consists of finely divided parts, we shall easily understand how it happens that it comes sooner into action than that of cattle, and whence it arises that on further putrefaction, when lying in heaps, they generate so much heat.

The *excrement of the cow*, when fed on green spurry, contains, according to the same chemist, 15 or 16 per cent. of vegetable fibre, while the excrement of sheep fed on hay contains only 14 per cent. of that substance; now, as the amount of water in cattle-dung is about 4 per cent. more than that of sheep, and since the proportion, therefore, of vegetable fibre ought to be largest in sheep-dung, we may draw the conclusion, as before,—that the sheep digests a portion of the vegetable fibre itself.

From the pulpy nature of cattle-dung and the firmer character of sheep-dung, we might indeed conclude that the difference in the proportion of the water they contain would be greater than 4 or 6 per cent.; but the vegetable fibre being in a finer state in sheep than in cattle-dung, it is capable of containing more water within its interstices without such additional water being obvious. Now, although the excrements of sheep undergo a quicker decomposition than those of cattle, this does not take place in the ordinary mode in which the sheep manure is obtained, there being a deficiency in the moisture requisite, and the dung so firmly trodden down by the sheep, which is not tied up like the ox, that oxygen, which is essential in every case of quick decomposition, can gain no entrance; accordingly in sheep mamanure, which has lain perhaps a year or more in the sheep-house, we will always still find solid excrements in which scarcely any change is perceptible.

As sheep drink very little water, they accordingly void a very inconsiderable quantity of urine; but, when they take no drink whatever, the water in the urine, and that found in the solid excrements, is greater in amount than what existed originally in the food taken by the animals; and hence it follows, that as sheep likewise breathe out water in the form of vapor from the lungs, and evaporate it through the skin, they must produce water chemically from oxygen and hydrogen during the process of digestion.

The *urine of sheep*, on account of its small amount, is therefore never collected and used by itself, but is always taken up by the litter, and applied to the land along with the solid excrements ; yet, although not employed separately, it is nevertheless interesting to learn the component parts of this urine. With this view I have several times submitted it to a superficial chemical analysis, and I have found that it is more abundant in salts than the urine of the cow ; without, however, containing so many substances possessing nitrogen. 100,000 parts by weight of the fresh urine of sheep kept at grass, and which, when tested, was found to contain neither acid nor alkaline properties, contained—

Water, - - - - - - - - - - - -	96,000
Urea along with some albumen and coloring matter, - -	2.800
Salts of potash, soda, lime, with some traces of silica, alumina and iron, - - - - - - - . -	1.200
	100.000

Sheep urine contains, therefore, as we perceive 4 per cent. more water than cattle-urine ; but, possessing a tolerable quantity of urea, it passes quickly into decomposition and developes, in consequence, much ammonia ; a fact which explains the occurrence of the strong ammoniacal smell in the places where sheep are kept—this smell being much increased, however, by the ammonia likewise produced by the decomposition of the solid excrements, which contain much nitrogen, and by the exhalation of a certain quantity of ammonia through the skin of the sheep. The ammonia thus formed, naturally evaporates the sooner when the manure is deficient in moisture, which would retain it. Hence it is obvious how great a quantity of this incomparable manure is lost in the ordinary management of the dung when sheep are kept in houses, and how anxious we should be to introduce some better plan for obtaining it.

The *keeping of sheep in houses* will probably sound strangely in some of our readers' ears. In the north of Germany, however, the severity of the climate during winter requires such protection. In that country the practice is not only necessary for the health of the sheep, but is attended with great economy of food. The views lately developed by that illustrious chemist and physiologist, Professor Liebig, throw great light upon this as well as upon almost every other branch of rural economy, in which he seems, with master-hand, to "unfold all nature's law ;" and has been ably supported by the recent publications of Professor Playfair on the same subject. According to these views the craving for food is much increased by cold; and the increase of food required by animals when exposed to cold, does not go to form fat and increase the growth of the animal, but is expended in keeping up the proper temperature.

It is important to be fully aware that clothing and shelter supply, to a great extent, the place of food; at all events, that food will go very much further when aided by reasonable shelter. A very valuable proof of this has been recently given to the agricultural world by Walbanke Childers, Esq., M. P., which is recorded in the second part of the first volume of the Royal English Agricultural Journal. By this experiment it appears that forty sheep, of equal size and weight, were selected: twenty of these were fed in the usual way in the open field, and the other twenty in a rough shed; yet the latter—although they received nearly a fifth less food than those in the open field—showed an increase of twenty stone more in the short space of four months. At Lord Ducie's experimental farm, also—of one hundred sheep, kept in the open fields from the 10th October to the 10th March, each eat 24lbs. daily of Swedes; while another hundred, having a covered shed and a yard to run into at pleasure, only ate 20lbs. each of the same turnips: thus clearly proving this saving of food to have been occasioned solely by protection from the weather; and that, for fatting sheep, the plan is excellent.

We must, however, admit that our great flock-masters, after frequent trials of the standing-fold in exposed situations, yet prefer keeping their lambs in the open field—as finding them less apt to scour, and generally more healthy than when kept in folds; and that grown sheep, when kept there, are frequently found subject to the foot-rot. The folds should, therefore, be thoroughly drained, and the sheds lofty; to secure a dry floor, and a good circulation of air. In those countries where these standing-folds and sheds are in use, there is much difference of opinion regarding the expediency of frequently cleaning them out, or allowing the dung to remain there and accumulate for the purpose of manure. So far as our own observation extended in the North of Germany—where we have had practical experience upon a large scale—the most usual mode is to leave the dung untouched; and, in our judgment, it is the best: for if the dung be occasionally covered, however slightly, with straw or fern, or even only with dry sand, the warmth of the bedding will add greatly to the comfort of the sheep, and their constant treading will prevent the fermentation of the manure, which will thus become a mass of the most valuable compost.

CHAPTER V.

Analysis and power of Human Ordure—Chinese management.—Bones.

NIGHT-SOIL is the most powerful manure we have at our command, and should be preserved with the most scrupulous care, if we would preserve and increase the fertility of our soil. Human ordure, of which it is produced, is full of oil and volatile alkaline salts, of a more powerful nature than that of animals; though differing probably in its own qualities in proportion to the sort of food from which it arises: as we even know that the dung of carnivorous animals is stronger and hotter in its effects upon the land, than that of those fed upon vegetable diet. We, indeed, want not abundant proof of the extraordinary effect of this manure, and the subjoined analysis by Berzelius of the solid and fluid excrements of man will show that they contain, in a very condensed form, all the substances required for the nourishment of plants. The dried solid excrement contains rather more than 13 per cent. of ashes, which consist of the following salts:—

Carbonate of soda, - - - - - - - -	3.5
Muriate of soda, - - - - - - - - -	4.0
Sulphate of soda, - - - - - - - -	2.0
Phosphate of Magnesia, - - - - - - -	2.0
Phosphate of lime, - - - - - - - -	4.0
	15.5

Urine, 1000 parts:

Water, - - - - - - - - - - -	933.00
Urea, - - - - - - - - - - -	30.10
Salts of ammonia, with some animal matter, - - -	18.46
Sulphate of potash, - - - - - - -	3.71
Sulphate of soda, - - - - - - -	3.16
Phosphate of soda, - - - - - - -	2.94
Phosphate of ammonia, - - - - - -	1.65
Muriate of soda, (common salt,) - - - - -	4.45
Muriate of ammonia, - - - - - - -	1.50
Earthy matter, lime, and silica, - - - - -	1.03
	1000

The *quantity of night-soil* a farmer might obtain in his own neighborhood, and even upon his own farm, is by no means inconsiderable, and is well deserving his attention. An irrational prejudice, founded upon the disgust occasioned by its fetid odor, has however hitherto prevented its being sought after with that avidity which it merits. It has, indeed, been assumed that the excrements of a man, when used for the purpose of manure, can be made to produce a sufficiency of corn for his support; but although that may be an exaggeration, there can be little doubt, that were it made available, it would add largely to the production of the land.

China is the birth-place of the experimental art. The incessant striving after experiments has conducted the Chinese, a thousand years since, to discoveries which have been the envy and admiration of Europeans for centuries, especially in regard to dyeing and painting, and to manufactures of porcelain, silk, and colors for painters. Half a century sufficed to Europeans, not only to equal, but to surpass, the Chinese in the arts and manufactures ; and this was owing merely to the application of correct principles deduced from the study of chemistry. But how infinitely inferior is the agriculture of Europe to that of China! The Chinese are the most admirable gardeners, and trainers of plants, for each of which they know how to prepare and apply the best adapted manure. The agriculture of their country is the most perfect in the world; and there, where the climate differs little from the European, very little value is attached to the excrements of animals. Horses are there seldom used in agriculture ; the stall-feeding of cattle is unknown ; and Liebig states, in his Organic Chemistry, that "the corn-fields in China receive no other manure than human excrement." We are here great theorists. The quantity of manure consumed by this and that plant is calculated in our writings to the hundredth fraction; and we have analyses without number of the component parts of all the materials applied to forward their growth: and yet, from the want of accompanying experiments, we know not what manure is!

The business of collecting urine and night-soil employs an immense number of persons in China, who deposit tubs in every house in the cities for the reception of the urine of the inmates, which vessels are removed daily with as much care as our farmers remove the litter from their stables.

In many parts of the Continent it is the regular practice, and would, doubtless, be pursued in this country, were it not for an unfounded idea that it communicates an unpleasant flavor to plants grown in the land upon which it has been used, and we have heard, that when employed in an unprepared state for the growth of potatoes it has had that effect. Market-gardeners, however, use it in profusion, as a very stimulating manure, which forces vegetables to early production, without imparting to them any disagreeable smell: its only objection being, that the rapidity of its action is apt to render the roots insipid ; which, we imagine, might be corrected by using it more sparingly, or as a compost made up with equal parts of lime and earth. A great objection arises from the difficulty attending its conveyance from the towns in consequence of its offensiveness, as well as in reconciling farm-hands to work at its preparation ; but, if made up into a desiccated state, as powder, it forms an admirable top-dressing for wheat, or in drilling the seed for any species of crop.

By comparing the above analysis of night-soil with that of *Guano*—a foreign manure recently introduced into this country from Peru—which is also remarkable for its powerful effect, it will be seen that the same essential ingredients are common to both. The following is the analysis of guano by Professor Ure:—

Azotized organic matter, including uratea ammonia, and capable of affording from 8 to 17 per cent. of ammonia, by slow decomposition in the soil, - - - - - - - - - - -	50.0
Phosphate of lime, - - - - - - - - - - -	25.0
Ammonia, phosphate of magnesia. phosphate of ammonia and oxalate of ammonia, containing from 4 to 9 per cent. of ammonica, -	13.0
Silicious matter from the crops of birds, - - - - - -	1.0
Water, - - - - - - - - - - - - -	11.0
	100.0

Now, looking at the composition of guano, even without any actual experience of its effect, there can be no question that it is a most valuable and powerful manure;[*] and such it has really proved to have been for ages past in the country from which it is brought; as the most barren lands, by manuring with guano, produce abundant crops of maize or Indian corn. It is evident that its fertilizing property is owing to its containing nearly all the essential constituents of plants, and particularly those which are most likely to be deficient in soils, and its analysis is given here to show how nearly night-soil—that is, the *solid and liquid excrements of man*—resembles it in this respect as well as others, and thereby to exhibit the glaring inconsistency of using every means to waste and get rid of night-soil, which is almost identical with guano, while we fetch the latter from a coast about fifteen thousand miles distant.

From the concentration of society in large cities and towns, and the enormous quantity of the phosphates contained in the corn and cattle which is there consumed: looking also at the prodigal waste there made of that valuable substance, and its indispensable necessity to the production of good crops of corn,—and more particularly of wheat,—it is much to be regretted that greater care is not generally taken of night-soil; which, if applied to the land, would enrich it more than any manure which is known, or which, we imagine, will ever be discovered.

Bones have been extensively used as a manure upon light turnip soils, and with such good effect as to have produced heavy crops upon wold-land, which was formerly almost sterile. Their effect is owing to their consisting of phosphate of lime and magnesia, and also gelatine; which latter substance contains nitrogen. Bones which are used as manure are, in general, previously boiled by the crushers; in consequence of which the greater part of the gelatine is extracted, and they are said in this state to produce a more rapid effect; which may be owing to the oily matter which they likewise contain when unboiled, preventing, or at least retarding, their decomposition. There can, however, be no doubt that unboiled bones would ultimately have a more permanent effect on the land. They are broken into small pieces, and usually employed in drills for the turnip crop, at the rate

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Since the preparation of this treatise, the effects of Guano, as a manure, have been amply tested, and with highly satisfactory results.

of from 16 to 30 bushels the acre. The smaller the pieces into which the bones are broken, or the nearer to which they are reduced to powder, the more immediate will be their power over the production of the present crop. Their cost is indeed increased according to the smallness of the size to which they are reduced; but farmers who use them upon poor soils should, nevertheless, get them as small as possible, for the sensible purpose of thus obtaining a good crop of turnips, which, when fed off, will be sure to produce equally good crops in the future rotation. In point of expense, it should also be remembered that the smaller they are broken the greater will be their power, and consequently a less quantity may be used.

On clays they are now seldom employed, as they show no immediate effect, and require more than light land; but they cannot fail to be ultimately beneficial to the soil. They are, however, sometimes laid as a top-dressing upon clovers and meadow-land in moist weather, when they can be rolled into the ground; and, as the main point is its permanent improvement, they are used in their raw, unboiled state; or, in what is technically called "green bones," whenever they can be got in that fresh condition. Previous to their being laid upon the land, they are generally exposed to a degree of fermentation, by putting them in a heap of horse or sheep dung, as the heat thus generated soon occasions it to commence: but the heap should be coated with earth, to prevent the escape of the ammonia.

If not wanted for immediate use the better mode is, however, to mix them up with fine mould, which will absorb the ammonia, instead of occasioning its loss; and, when laid upon grass, will be found not only to materially thicken the sward, but also to sensibly improve the value of the herbage; but whether used as a top-dressing, or drilled into the ridges along with the seed, we cannot too forcibly impress upon the farmer the propriety of getting the bones ground to as fine powder as possible; for although aware of the difficulty of the operation, the charge will be repaid by the benefit.

PART II.

MINERAL AND ARTIFICIAL MANURES.

CHAPTER I.

Gypsum, Sulphate of Lime, or Plaster of Paris.

THE name of PLASTER OF PARIS has been given to this salt, from its having been found in great quantity in the neighborhood of Paris. It is composed of

Lime	28
Sulphuric acid	40
Water	18
	86

It desolves with difficulty in water, and requires 500 times it weight of water to effect its solution. By burning, its water of crystallization is entirely evaporated, by which 86 pounds are reduced to 68 pounds, and it then assumes the form of a perfectly white powder, in which state it is generally sold to the plasterers.

It has been extensively used in agriculture, and though highly beneficial to some lands—more particularly in promoting the growth of clover, sainfoin, and the grasses,—it has, in the great majority of instances, proved perfectly useless; or rather has produced no visible effect. These failures have doubtless been owing to the simple fact, that many soils contain this earthy salt in greater abundance than plants require. In soils which contain all the other substances which plants require for their food, except sulphate of lime, or a very insufficient quantity, the plaster of Paris will have a powerful effect, and this remarkable effect has, in particular instances, led to an indiscriminate application, which has often disappointed the expectation of the farmer. These disappointments will constantly occur so long as any particular salt is used, any *one part* of the food of plants, because it may have proved beneficial in a particular instance. If GYPSUM produces a beneficial effect when applied in a small quantity, it is a proof that the soil did not before contain it in sufficient proportion. On such a soil it will again prove beneficial in a short time, but if a larger dose be administered, a corresponding time must elapse before it again produces any effect. It is owing to the want of viewing the operation of manure in this light, that gypsum has been often so extravagantly extolled by some parties and recommended to universal application; and, on the other hand, so indiscriminately abused by others. The true cause of its occasional failure was first pointed out by Sir H. Davy. There is a reasonable and satisfactory cause to be assigned for the success and failure of every kind of manure, if people will take the trouble to make the inquiry.

The author of the British Husbandry in the Library of Useful Knowledge thus speaks of gypsum: "In Scotland and in many other parts of the United Kingdom it has been found nearly inefficient; yet on Mr. Coke's farm in Norfolk great benefit has been derived from laying it in powder at the rate of four bushels per acre on sainfoin layers; the crops of which are said, in other accounts, to have in some instances doubled. In some experiments made in Kent, and recorded in the communications to the Board of Agriculture, it also appears to have been employed with such advantage on calcareous sandy loam, and even on stiff soils which had been previously chalked, that it is said to have increased clover and lucerne at least three-fold, and to have proved equally beneficial to leguminous crops. Thus it has been stated by Mr. Smith, at Tunstal, near Sittingbourne, "that having a field of red clover which had been manured with gypsum, and had produced a very fine crop, he carefully repeated the trial on two square perches: one carefully spread in the middle of April with powdered gypsum at the rate of five bushels to the acre, and the other without any; the result of which experiment upon the crops, when mown for hay and afterwards cut for seed, was as follows:

	Cwt.	Seed.	Straw of the Seed Crop.
Gypsum, - - - -	60	3 21	22 3 12
No Manure, - - - -	20	0 20	5 0 0

"The cost of the gypsum was then 5s. per bushel, though it is now much less; and he values the difference between the two crops at no less than £16 2s. 9d. in favor of the experiment; to which he adds, he had ten acres of lucerne, five of sainfoin, and three of Dutch clover, each dressed with a similar quantity of gypsum as a top-dressing, which, to all appearance, received a similar benefit."

He says "that cattle show such a remarkable predilection for clover which has been gypsumed, that, after having once tasted it, they have been observed to walk deliberately to it, the whole length of a field, without tasting apart that which was grown without it, though a tolerably good crop; and, in his opinion, it not only increases the vigor and the verdure of the plant, but also perceptibly increases the juices."

"The following experiments upon its application comparatively with ashes upon different perches of clover, afterwards cut in full head, also show it to have been attended with superior effect:—

	lbs.	oz.
No. 1. No Manure - - - - - - - -	38	6
2. Four quarts of sifted coal-ashes which had not been exposed to the weather - - - - - -	50	0
3. One quart of gypsum - - - - - -	54	8

Second.

Nos. 1 and 2. Sprinkled, separately, with one and two quarts of gypsum.

3 and 4. Do. with three and four quarts of ashes.

5. Do. with five quarts of wood-ashes.

"The produce of the last was, on Nos. 1 and 2, equal and rather superior to those of 3 and 4. That of No. 5 was the worst; but each patch, when compared with the adjoining land that had no manure, was not only considerably higher, but thicker, of a deeper and more luxuriant color, and of a broader leaf.

"In various other repeated trials made with great care and attention upon sainfoin sown on poor, light, chalky land, the several results show a considerable balance in favor of the application of gypsum; the hay crop yielding so abundantly as to exceed that upon which it had not been laid upon an average of 44s an acre; it likewise afforded a proportionate increase of sheep pasture; and if sown with peas, when looking up, it generally produced immense crops. It has been laid down at the rate of five bushels with similar success upon clover, on a certain portion of the land, in the middle of a large field where the soil was of the same quality; the entire field was then sown in the following November with wheat, the appearance of which, both in color and strength, on that part which was gypsumed, became very apparent in the month of May; and was so striking at harvest, that, when separately reaped, threshed, cleaned, and measured under careful inspection, the following was the result:—

	Qrs.	Lbs.		£	*s.*	*d.*
Gypsum produced, per acre, -	4	6,	at 72s. -	17	2	0
No Manure - - - -	2	4	" -	9	0	0

Three-quarters per acre having been the largest crop ever before grown upon that field during twenty-eight years that it had been occupied by one person, when wheat had followed beans, peas, and trefoil, in the common course of husbandry. When thin upon the ground, clover, if top-dressed with uncalcined gypsum at the rate of five or six bushels per acre, according as the plants may have been more or less thin, has been found to stock out with such luxuriance that a difference of a load an acre has been observed between that and the same crop on land of the same quality which had been left without manure. We learn also from Russell that it has been laid on a neighbor's farm in Warwickshire in the latter end of April, 1830, at the rate of about three bushels to the acre; and that when mown, on the 21st of June following, there was an astonishing improvement in the crop on that part of the field which had been so dressed. Its application to lucerne has also shown it to be of equal effect.

"Extraordinary as this may appear to those who may have experienced contrary effects from its use, yet these well-authenticated accounts of its efficacy, added to the concurrent testimony of many other eminent farmers, should induce further trials; for conclusions should not be hastily drawn from partial experiments, which are, in many cases, made without due knowledge or consideration of the grounds upon which they are founded. It is, indeed, quite incontestable that many of the objections which have been made to its use are more apparent than real; for even the failures in those trials which have been stated almost uniformly consist, not in any pernicious effect, but in the want of those superior returns, when compared with unmanured lands of the same quality."

The above statements are exceedingly interesting, and we have quoted them at full length, because a due consideration of them will confirm the views we long since entertained—namely, that gypsum only operates powerfully when applied to soil which is deficient in that substance. Now it is known that gypsum enters largely into the composition of clover, sainfoin, pulse, and wheat crops ; which crops, therefore, exhaust it rapidly from the land. It appears that the land mentioned as having been so very much benefited by the application of gypsum had been heavily cropped with such plants, and thence it is fair to infer that the gypsum was exhausted; and this appears the more probable as the land upon which these effects were produced does not generally contain gypsum in any considerable quantity ; and, though there can be no doubt that land so cropped was well supplied with common manure which contains some gypsum, yet from the original deficiency of that substance in the soil, the drain upon it, especially by the pulse crops, was greater than the dung supplied. When, therefore, the gypsum was applied, the soil probably abounded in all the *other* substances which constitute the food of plants, and that addition completed the conditions of fertility.

These views of the *operation of gypsum* receive confirmation from the general observation that it succeeds best upon light, dry, sandy, gravelly and chalky soils ; but produces little or no effect upon heavy loams, strong clays, and wet land. Now the former of these are precisely the soils in which it is seldom found, while it often abounds in the latter.

Again, it has been observed, that it produces no effect upon *exhausted* land. The plain explanation of its failure on such land is, that, though it may be wanted, yet it will not supply the place of *all other substances*. Gypsum has a two-fold operation. It constitutes part of the food of plants, particularly of clovers and the pulse kind; and, according to Liebig, it attracts and detains the ammonia of the atmosphere. In Canada it appears to have a still greater effect upon the clover crop than what is recorded of it in England. This, probably, is owing to the great richness of the Canadian soil in all the other means of fertility, though it is wanting in gypsum, which the husbandman artificially supplies. The success of coal-ashes, recorded above as having been tried with gypsum, plainly indicates that their effect upon clovers principally depends upon their containing that salt.

CHAPTER II.

Wood-ashes—Coal-ashes—Soot—Peat-ashes.—Lime.—Marl.

WOOD-ASHES contain, in a greater or less degree, all the more essential elements, or substances, which form the food of plants, except ammonia; or rather all those which are not abundantly supplied by the atmosphere. The most abundant of these are *potash* and *earthy phosphates*. The quantity of these, however, is very variable in the ashes of different plants. Those produced by beech-wood contain about one-fifth part of phosphates, while those of the oak yield scarcely any phosphates. The powerful effect of wood-ashes in promoting the growth of clover of every kind is well known. In Germany, no other manure is used for grass lands, and by these they are kept in the highest state of productiveness.

The following table contains a statement of the quantity of potash contained in some of the common trees and plants:—

10,000 parts of Oak,	15
" Elm,	39
" Beech,	12
" Vine,	55
" Poplar,	7
" Thistle,	55
" Fern,	62
" Cow-thistle,	196
" Wormwood,	730
" Vetches,	275
" Beans,	200
" Fumitory,	790

The *ashes produced from the leaves of trees* contain much more potash than those of the twigs and branches, and those of the latter more than those of the trunk of the tree; while the ashes of the two latter contain the most phosphate and carbonate of lime. The quantity of potash in the leaves varies very much with the season of the year, being greatest in the spring and least in the autumn.

In some parts of England it is the practice to burn the stubble for the sake of the benefit afforded to the succeeding crop by the ashes; and it is a very common practice upon the Continent. Considering the value of straw for litter, this must be a practice of very doubtful benefit; and, where the stubble is not cut for litter, it must, when ploughed down, ultimately afford to the land all that the ashes contain, and something more.

Coal-ashes are often available to farmers, and there are few situations in which they are not beneficial, especially as applied to clover and grass crops; and a consideration of the substances they contain will readily account for the effect they produce. Besides the earthy and imperfectly burnt coaly matter of which they principally consist, they also contain sulphate of lime, with some potash and soda, all of which are known when separately applied to produce a good effect on clover crops, and to favor the production of white clover particularly. They are, in fact, an important part of the food of all grasses. The effect of coal-ashes is most remarkable when applied to clovers growing on sands, and particularly the green sand. It is natural to expect that the effect produced depends very much upon the kind of coal from which the ashes are produced, though this difference does not appear to have been much noticed by agriculturists, nor the reason of it understood.

Peat is often within the farmer's reach, and whenever it is, may be turned to very good account, either to burn for the ashes, to apply directly to soils deficient in vegetable matter, or for the preservation and augmentation of the products of the farm-yard. When directly applied to land in its crude state, its operation is two-fold—mechanical and chemical. In the first place, it keeps the soil open and attracts moisture and gases from the atmosphere; and in the second, it yields, by its slow decay, carbonic acid gas and the saline substances it contains, to the roots of plants. For the first of these purposes, that of merely opening the soil, and the attraction of moisture, &c., almost any kind is equally valuable; but the great diversity in the effect of peats must depend principally upon the saline and earthy substance they contain.

The *ashes of peat*, accordingly, differ very much in value, as they are rich or poor in saline matter; and in some situations they are the only manure used for the turnip crop at the rate of from thirty to fifty bushels per acre. A few peat ashes, and also of partially-dried peat, stored up, as opportunity offers, in the neighborhood of a farm-yard, may be frequently used with the best effect in preserving and increasing farm-yard and other manure, as we shall hereafter show—our object in this place being rather to speak of the nature, than the application, of fertilizing materials.

Professor Brande has given an analysis of some excellent ashes of this kind brought from Holland, where they are greatly prized and extensively used:—

Silicious earth, - - - - - - - - - -	32	parts.
Sulphate and muriate of soda, - - - - -	6	"
Sulphate of lime, - - - - - - -	12	"
Carbonate of lime, - - - - - - -	40	"
Oxide of iron, - - - - - - - -	3	"
Impurities and loss, - - - - - - -	7	"
	100	

According to Sir John Sinclair's account of the agriculture of the Netherlands, they are used in the following manner:—

In March the wheat is worked with the hoe between the rows, and the land is sown with clover; and in May the wheat is hand-weeded. The crop being reaped, the land is harrowed in the following spring; and then the ashes are spread by hand upon the clover in calm and hazy weather at the rate of eighteen to twenty bushels per acre. They are also laid on pastures and on wheat in March and April; on oats and beans in the beginning of May; and rye in October and November. Their chief employment is, however, on green crops; it having been found on comparative trials in Flanders that when the ashes were used as top-dressings on clover, the crops were much earlier, heavier, and superior in every respect, to those which had undergone a top-dressing with horse and cow dung. One of the best proofs of their usefulness, indeed, is the fact that, while our crops in this country very often fail, such an instance but rarely occurs in any part of Holland. Sir John adds the public declaration of eighty-three practical farmers to this effect,—"that they know by experience that when clover is not manured at the rate of about nineteen bushels to the acre, the following crop is very bad, notwithstanding any culture that can be given to the soil: whereas they always have an excellent crop of wheat after clover, and, doubtless, in proportion to the quantity of the manure above mentioned being used. The composition of these ashes, as given above, indicates the cause of their fertilizing quality. As they are light and black it is probable that they are not entirely burnt, but charred, and also contain potash."

The farmers who subscribed this declaration must have been deeply impressed with the importance of these ashes; for, besides being brought through the canals from Holland, they must, in most cases, have been afterwards carried from forty to fifty miles by land carriage: indeed all import them into this country from Rotterdam.

Soot must have a powerful effect as a manure, from the large quantity of ammonia it contains in the shape of carbonate and sulphate of ammonia; though its quality must differ considerably, according to the coals from which it is derived. It is extensively used in England as a top-dressing, spread by hand, at the rate, on seeds and pasture, of twenty to thirty; and on wheat, barley, and turnips, from forty to forty-five bushels per acre. It is, however, more generally employed on wheat, and is considered one of the most powerful top-dressings for that crop with which we are acquainted; and experiments have shown its power to be materially increased by an admixture of one-fourth of common salt; more particularly when laid upon pasture land, the grass of which soon after assumes a growth of much increased luxuriance. Though it has almost always been used as a top-dressing, it is probable that it would have a greater effect if used as a compost with other substances by means of the drill; and has, in that manner, been successfully employed in the cultivation of potatoes by an eminent farmer in Gloucestershire. We perceive also, that, in a recent comparative experiment on different manures for the growth of carrots, 54 bushels of soot, and 6 of salt, produced larger crops of both the Alteringham and white Belgian species than 24 tons of stable manure, and 24 bushels of bones: though at one-half the cost.

As the ammonia is the most essential part of this manure, the exposure of it thinly spread over the surface of the ground must occasion considerable waste from evaporation. To mix it with lime, as some farmers have recommended, must be still more injurious, as that alkali causes its rapid dissipation. As ammonia is never found in too great abundance in any soil, but is suited to every kind of land, and has an excellent effect in bringing forward wheat, the plant of which has been weakened and thinned by slugs or a severe winter; but, when used as a top-dressing, the land should be hoed after the soot is spread. The wheat, so managed, soon acquires a dark color, and begins to tiller and spread with every appearance of vigor: it is, in fact, the best means of resuscitation that the farmer can command in this critical state of his principal crop.

Lime acts a very important part in promoting the fertility of soils. The purest limestone, that is, the finest kind of marble, consists of lime and carbonic acid gas. The equivalent of lime is 28, and it unites with 1 atom of carbonic acid gas, whose equivalent, as before noticed, is 22 to form carbonate of lime, or pure limestone. When such limestone is burnt in a kiln, the carbonic acid gas is driven off, and it becomes caustic lime, having lost 22 parts in 50, or 44 per cent. of its weight. But all the common limestones are more or less impure, and particularly those which make the proper mortar for water-works. These limestones contain both clay and potash, to which, and particularly the latter, a considerable portion of their fertilizing effect must be attributed. When quick or fresh-burnt lime is exposed to the air it slakes, by attracting moisture; and when perfectly slaked under cover, or where no rain falls upon it, it has imbibed one-third of its original weight of water; that is, 28 parts of pure quick-lime will become 37 of slaked lime; or, as the chemists call it, "*hydrate of lime*." If this *slaked lime* be exposed for a much longer time to the action of the air, it gradually imbibes from it carbonic acid gas; which, as we have shown, is always contained in the air, and then becomes reconverted into mild lime, or powdered limestone: during which change it parts with the water, as no water is contained in limestone, or carbonate of lime.

Quick-lime is not itself, properly speaking, hot; the heat produced by slaking lime proceeds from the water, the solid elements of which unite with the lime, and give out the heat which before rendered them fluid. Lime, in its caustic state, acts as a poison to plants, by destroying their texture; and it is owing to this circumstance that magnesian lime, when applied in considerable quantity, proves injurious, as that kind of lime remains a long time in a caustic state, owing to its weaker attraction for carbonic acid. Lime should never be applied to farm-yard manure to make compost; nor to land recently folded; because it immediately takes up the more soluble and valuable part of the manure, which it never relinquishes. It acts very beneficially upon peat, and all soils containing much rough vegetable matter, with which it forms valuable compost, and for the reasons before given.

Marl is a very valuable mineral manure, the operation of which has been little understood, though it has been used from the earliest times. Even within these two or three years it has been regarded as an improver of the soil, by affording carbonate of lime, which is limestone in a state of minute division; but the German chemists, and particularly Sprengel, have made the important discovery that it owes its chief virtue to the presence of saline substances, as it is found to contain sulphate and phosphate of lime and potash. Whenever, therefore, marl can be had at a convenient distance it must prove a valuable manure on most lands, and should be always used in preference to any other earth for making compost. The only limit in its application to grass-land is that it should not be laid on so thick as to destroy the grass by excluding the air.

Having thus noticed the several substances which constitute *farm-yard manure*, and also those which generally, according to local circumstances, are more or less within the farmer's reach, and which serve either to increase its quantity, preserve its quality, or to supply its place; and having given some description of the nature of these several substances, we now proceed to the consideration of the best mode of managing them so as to turn them to the best account, and also to detail the practice and opinions of the most enlightened agriculturists.

PART III.

ON THE MANAGEMENT AND APPLICATION OF MANURES.

CHAPTER I.

Knowledge of Farming—Soiling—Improvement of the Land upon Scientific Principles.

It may be truly said, that *every farmer is a practical chemist.* It may, indeed, with equal truth be asserted, that no practitioner would derive more benefit from understanding the principles of his art, and that there is no other art in which the most enlightened practice is of half so much importance to mankind; for (to quote the language of Liebig) "there is no profession which can be compared in importance with that of agriculture: as to it belongs the production of food for man and animals; on it depends the welfare of the whole human species; the riches of states, and all commerce." It is presumed that the preceding explanations of the nature of the several substances which, as manure, fall under the farmer's management, will enable him to form, and to appreciate, more precise notions as to the proper mode of treating them; and that he will the more readily understand the force and meaning of the suggestions offered.

When we know that in all good farm-yard dung there is a volatile substance called nitrogen, which, by fermentation, is rapidly converted into ammonia, and in that state escapes into the air and is entirely lost; and when we also know that this substance is the most powerful fertilizer of any in the dung; that neither seeds nor plants can be produced without it; and that certain substances attract this ammonia and prevent its escape, we have made a very profitable discovery. When we have learned that, besides this invisible but important substance, there are others equally invisible in the mass of dung, and no less necessary to the growth of plants, most of which substances are readily soluble in water, and in that state are easily carried away (such are the salts of which potash, soda, and ammonia, are the bases)—and know how their escape may be effectually prevented; we are then placed in a very advantageous position, from which the greatest benefit might be derived; and it is certain that the farmer's prosperity must be materially influenced by the use he makes of such knowledge in the management of his manure.

A most important means of increasing the quantity and improving the quality of farm-yard manure is the affording a plentiful supply of turnips, and other green food, for soiling the store cattle in the yards during the winter ; a practice no less essential to the thriving and good condition of the cattle than to the improvement of the manure. It is, indeed a great object to obtain heavy crops of the best quality of such food for winter fodder. In summer time, also, an immense quantity of valuable dung may be accumulated by giving clover and grass to horses and other stock in the yards ; as done in Scotland and the northern counties, soiling, where it is practised to a great extent, and with the best effect.

Cut clover has been given to milch cows in the months of July and August when the weather is hot. At that season, they come in from their pasture at eight or nine in the morning, and are not put out again till four in the afternoon, getting, in that interval, a full feed of clover ; and it has been said, that an acre of ordinary clover will serve fifteen cows for this purpose for two months, and we know, practically, that one acre of *cut* clover will go as far as three acres *in pasture*. It must, however, be acknowledged that those who have tried giving clover to their cows in the yards, have found that they did not give so much milk as when they were at pasture, but that is not inconsistent with the advantage of soiling them in the middle of the day.

Even pigs may be soiled on clover ; and it is well known that they may be soiled on cut green beans, with great profit, if planted at three different times, for the sake of a regular succession.

Animals, when pastured, evidently destroy a great deal of food in various ways, not only injuring the herbage by their teeth, but by trampling upon it, poaching it in wet weather, lying down upon it, dunging and staling ; all which are prevented by cutting the herbage and carrying it from the field. It has also been justly observed, that, by soiling, a great quantity of rich and valuable dung is produced where none could otherwise be procured ; and this may be used upon the cultivated fields with far greater advantage than could be obtained from the portion of dung left by the animals upon the same field in the event of the animal having been dispastured. Much, indeed, has been written in objection to the system ; and we admit, that green food consumed in the field is returned to the soil by the animals fed on it, in the shape of dung. Nor are we insensible to the considerable expense which is incurred by carrying the crop off the field to the fold-yard, and returning it, as manure, to the field ; but weighing the subject maturely, it is a matter for at least serious consideration, whether the profit does not exceed the loss. Much must depend upon the nature of the land, and the distance from the homestead ; but it has decidedly the advantage of not only increasing the quantity of manure, but also of enabling the farmer to use it at his pleasure, as occasion or judgment may require.

Respecting the improvement of the *quality* and increase *of the quantity of farm-yard manure*, there are other similar means, no less important, and peculiarly adapted to poor lands in remote inland districts, especially such as have been suffered to go out of condition. The improvement of such lands would be very much accelerated if, in addition to the application of lime and other attainable mineral manures, and a due succession of green crops, a portion of the corn were devoted to the feeding of sheep, mixed with the straw of the same corn, peas, or oats, cut into short chaff, and given in troughs with a very light sprinkling of salt. Most farmers are aware how much more powerful, as a manure, the droppings of sheep are when corn is given them ; and the superiority of stable-dung to ordinary farm-yard manure is merely owing to the more nourishing food given to horses. Corn consists entirely of the most essential elements of nutrition, both of plants and animals, principally of carbon, nitrogen, potash, soda, lime, and magnesia, with sulphuric, phosphoric, and muriatic acids. These, when taken as food in the corn, are again restored to the land in dung and urine, except such portion as is retained in the bones, flesh, and fat of the animals. By giving crushed corn, therefore, to the sheep and cattle, for the purpose of fatting them, it may be more advantageously disposed of in remote situations than by selling it; and while the stock, so fed, rapidly improve in substance and value, a large portion of the most efficient principles of manure is retained to increase the productive power of the land. Such a practice would, in many instances, form a more profitable method of disposing of a portion of the produce, than by carrying away the utmost quantity of corn that could by possibility be spared, particularly when it is considered that it would in a great measure remove the necessity, or supply the deficiency of the application of artificial manures.

When the true principles of the nutrition of plants and animals become more generally known and appreciated by agriculturists, there can be no doubt that more economical methods of managing and controlling the productive powers of nature will be adopted, and all the various resources which she presents will be eagerly sought and appropriated. Such knowledge is indeed power, and is more precious than fine gold. And though many excellent practical farmers are apt to regard such knowledge as superfluous, the time cannot be far remote when it will be considered a reproach to be ignorant of the leading and more important principles, at least of agricultural chemistry. The knowledge and application of mechanical and chemical principles have raised the manufacturing power of Great Britain above that of all other nations, has extended her commerce and empire to the remotest parts of the earth, and given her the produce of every clime. In agriculture she is yet in some respects inferior to the Chinese, and in some instances to the Belgians, and it is only by the more general diffusion of knowledge, and the application of principles, that she can hope to take a corresponding leading position in the march of improvement. The light that has been lately thrown upon the operations of agriculture by the profound and laborious researches of Liebig, which has been diffused rather than increased by numerous subsequent writers, the important discoveries of Sprengel, together with the diffusion of both scientific and practical knowledge by the exertions of the Royal Agricultural Society, bid fair to place the agriculture of England on a level with her manufactories.

Before we quit the subject of making the most of the produce of the soil for the feeding of stock, and the future benefit also of the soil itself, it may be well to notice an important difference in the provision made for sheep in two different parts of England. In the southern districts, a large provision of hay is made for the winter consumption of sheep, and this is not only given to them in the bare fold, but when they are feeding upon turnips, and is for the most part considered indispensable. In the midland counties, however, no such provision is made, and sheep are fed to a great weight upon turnips only. The farmers of the last mentioned districts contend that there is no necessity for providing hay for the winter feeding of sheep, and they are fortified in this opinion by the success of their practice. If they are correct, which there is little reason to doubt, a great loss must be incurred by the opposite practice. A given quantity of grass is known to be very much more nutritious than the same quantity made into hay of the best quality, and when we take into account the injury often sustained by hay from bad weather, and by heating in the mow, to say nothing of the expense and inconvenience of hay-making, the loss from this source, both as regards the sheep and the manure, must be very serious, and well deserving of the most serious consideration.

CHAPTER II.

Management of Manure.

In the *management of farm-yard manure* two primary objects present themselves: first, to prevent waste of every kind; and, secondly, to increase the quantity of dung by every means in the farmer's power. The waste is effected in the manner before alluded to, by unnecessary and excessive fermentation, by which the organic parts are dissipated in a gaseous form, and by suffering water to run through the dung, by which the inorganic substances, the salts, are carried away in solution. No dung should be allowed to ferment until a few weeks before it is put into the soil, and then only in that slight degree as to render it manageable, and to facilitate its decomposition when in the soil.

As the farm-yard is the general depot for dung in the raw state, care should be taken to give it such a form as may best preserve it, as well as bring it to perfection; and on this there is a little difference of opinion: some theorists recommending them to be made so *concave* as almost to amount to a *well* shape, giving as a reason in support of their opinion,—"that the virtues of dung can only be preserved by its being saturated with urine *or some other moisture;*" while others assert that dung-yards should be formed *convex*, and assign as their reason, "that farm-yard dung *should be kept dry.*" "Practical experience, however, points out," as Blaikie says, "that a medium between these two extremes is best." In this we concur; and the form which we recommend is to slope the sides towards the centre: making either at the centre or the lower end, as may be found most convenient, a tank (which may be made at much less expense than farmers generally imagine) to receive the soakings of the dung, towards which the entire surface of the yard should have a gentle inclination for discharge. The bottom should be made of concrete powdered brown lime and gravel, in the proportion of one of the former to six of the latter, mixed wet, and deposited immediately, or Macadamised stone: or, should the yard be concave, an under-drain should be carried from its centre to communicate with the tank, which should, in that case, be made outside the buildings.

The water from the surrounding roofs should be conveyed away by shoots, or spouts, from under the eaves, and no water from any source should be allowed to pass through the dung, except the rain-water which falls directly upon it. Indeed, independently of the injury which the manure will sustain by being saturated with water, there is also the very material consideration of keeping the store-cattle which are kept in the yards as warm and as free from wet as possible. The *dry-litter* from the horse-stables, shaken from the dung, should, therefore, be spread constantly and regularly over it, as it will add much to their comfort. If, however, there be a drain and tank, the yard should not, in our opinion, be bedded with any kind of earth, but should have a foundation for the straw, laid with the trimmings of hedges, quickens, the haulm of potatoes, or of those fibrous substances which are usually burned, as well as rootweeds, which should be collected from the farm, and mixed with a little quick-lime to insure their decomposition. In order to keep the cattle dry and comfortable, the dung from the stall-fed cattle and pig-sties, and every kind of rough-vegetable stuff or animal refuse, together with all the sweepings, soap-suds, and slops from the house, should be carried from the sheds to a compost formed outside the yard, and added in regular layers to the heap, intermixed with the dung of the horse; for, if this be not done, the manure will be of unequal quality, and the crop, even in the same field, will often display great disparity.

We are all well aware, that according to the most approved modes of laying out farm-yards, they ought to be surrounded with buildings, which should be raised above the level of the yard, which should also be divided into compartments for cattle of different sorts and age, and every arrangement made in their construction for the saving of labor, and increase of convenience, and if an intelligent farmer had the means of providing his homestead, there can be little doubt that he would be well accommodated: but he must take his land as he finds it, encumbered, as it frequently is, with ill-arranged and ill-assorted tenements which he cannot alter, and respecting which we, therefore, deem it unnecessary to offer any observations.

It is a common custom to lay a quantity of loose earth of some kind over the yard, as a foundation for the bedding of the cattle when they are taken for the winter, for the purpose of absorbing their urine, and thus creating, or at least retaining, a valuable portion of manure, which might otherwise be lost; and this we admit to be a consideration of material importance, though counteracted in some degree by the cold and damp which it occasions to the stock. If peat can be procured within any reasonable distance during the summer time, it should be carted to the neighborhood of the yard, and after laying spread to get tolerably dry, should be thrown up into heaps for occasional use during the winter, the yard being first covered with it as soon as the dung of the previous winter has been removed. The peat so laid up should occasionally be spread upon the surface of the dung; but in case it cannot be procured, a few hundred weight of gypsum should always be at hand to scatter over the dung from time to time, and also a small quantity of rough sea salt, or, if that cannot be had, common salt. A little of the gypsum should be also sprinkled every day upon the floors of the stables where the urine runs, which will be swept out and conveyed with the litter to the general depot in the yard.

From time to time, as the drainings of the manure accumulate in the tank, they should be pumped or conveyed back over the whole surface of the manure, so as to keep the body of the materials in a constant state of gentle moisture, as nothing is more prejudicial to its quality than allowing it to get alternately wet and dry: but the surface should be occasionally spread with dry litter. The whole should be kept firmly trodden down by cattle; a caution of course not needful where rough stock are kept in the yard, which is often the case. This is exceedingly needful, to prevent the untimely fermentation of the dung. The use of salt or gypsum is requisite to prevent the escape of the ammonia when the dung comes to be fermented, while the peat acts as an absorbent, and when fermented becomes a valuable manure. By pumping back the soakings the soluble salts are preserved, and the dung is kept moist.

Some farmers, of large holdings, improve upon this system, by placing the different species of manure in separate heaps, according to their different qualities and speed of fermentation: thus, for instance, the dung of horse-stables, as being of the richest and hottest nature, except that of poultry, that of fatting pigs and stall-fed cattle, as well as that of sheep, when kept in fold-yards, and lastly, the stores of the straw-yard; and this certainly affords the great advantage of enabling the husbandman not only to employ those manures at his own discretion, for the use of particular crops at various seasons, but also to either retard or accelerate their fermentation, by an intermixture with each other at the season or purpose for which they are wanted. On small farms, it is, however, inconvenient; but if the plan prescribed above be adopted, the effect of the manure of a farm would be nearly twice as great as when all such means are neglected.

The dung-yard should be considered as a manufactory of manure, and corresponding skill and attention should be bestowed upon it, if the farmer be desirous of placing his *first of arts* upon an equal footing with others. When it is found necessary to *cart the manure away*, in order to forward the business of the season, previous to the commencement of the work, a quantity of peat, marl, soil, or road earth should be collected on the spot intended to receive the dung. The *foundation of the heap* should be laid with such material about six to nine inches thick, according to the nature of the dung to be laid upon it, and it should be rather inclined to the centre: so as to retain as much as possible of the soakage of the heap; the sides should be kept upright, and the top level. At the conclusion of the carting the two ends should be brought up to the general level of the heap, and the whole surface, including the top, sides, and ends, should be well coated with the mould, or other material provided for the purpose. About three weeks or a month before the manure is required upon the land, the heap should be turned, the earth thoroughly mixed with the dung, and another layer or coating of earth placed against the sides and over the top of the heap, by which the whole will be kept moist, and the gases, produced by fermentation, prevented from escaping.

When the last accumulation of dung is carted out in the spring, for crops which are then in preparation, the cart should not be allowed to pass over the heap, but the dung should be lightly thrown upon a layer of earth prepared to receive it; and when the heap is finished, it should be encased and covered with the earth, as before directed. It is supposed, in this case, that the dung is carted about a month before it is wanted for the turnip sowing. At the end of that period the dung will be in a high state of fermentation, and when it is carted to the trenches of the field, the splitting plough should follow as fast as the dung is spread in the trenches, and by that means the dung covered while yet reeking, and the seed drill should immediately follow.

When farm-yard manure is carried out for the formation of dung-heaps which are not intended for immediate use, it is the common practice of most farmers to have the carts drawn over the heap for the purpose of compressing it, so as to delay its fermentation; which, however, not only occasions considerable additional labor to the teams, but also causes the manure to be trodden into lumps by the pressure of the cart wheels and the hoofs of the horses: thus rendering the decomposition of the heap so irregular as to cause that great disparity which may frequently be seen in the growth of crops which have been equally manured: the cause being attributed to the seed, or the land, or to any thing but the real reason. We are quite aware of the expediency in many cases of protracting fermentation, and the consequent necessity of compressing the dung: but this should be done regularly, with equal weight on every layer of the heap; and, if it cannot be effected by the treading of men, it can be still better performed by the roller, in the following manner:

Make the heap rather less in breadth than your roller, and to each end of this fix a movable iron, with hooks for the traces of a horse. Two horses will thus draw the roller, the dung-heap being placed between them, and they may be yoked together by a common whipple-tree and bars. Each layer of the heap will thus be equally rolled, layer after layer, without being trodden upon; and, as the heap gets higher, the labor to the horses will be much lighter than if they had to drag a loaded cart over it: independently of which the advantages of thus equalizing the quality of the manure, and enabling the farmer to spread it without having to break the lumps, and to incorporate regularly with the land, must be apparent to every practical husbandman.

By such management the great waste which frequently occurs from excessive fermentation or neglect, would be prevented. By the careful mixture in the yard of the several materials, the dung would be of uniform quality, and by the subsequent management, neither the ammonia nor the humus or decaying vegetable matter would be materially diminished by such cautious fermentation, nor could the soluble salts be washed away, and thus nearly the whole power of the manure would be given to the crop with such addition as the care and diligence of the farmer provides in the shape of peat, ditch scourings, slops, and refuse of every kind, gypsum, and salt. The two latter are most valuable materials when mixed in such proportion as to afford about one hundred weight of each per acre of the land dressed with the manure.

CHAPTER III.

Improvement of Manure.

It is well worth consideration whether the foregoing method of management might not be much improved upon by subjecting the manure to less exposure to the weather, by making the great depot in a pit under cover, and afterwards by limiting still further the degree of fermentation. The late Earl of Leicester found, that by using his manure much fresher than he had previously done, he obtained quite as heavy crops upon a much larger breadth of land. Little doubt can exist, that if the straw could be cheaply divided, so as to supersede the necessity of breaking it down by decay, a very slight degree of fermentation would suffice, and thus ammonia and sulphurous and carbonic gases would be prevented from escaping at all, or at least the loss of them would be still further diminished.

That so little care and well-directed skill has hitherto been manifested in the management of farm-yard dung in this country, can be no reason for continuing neglect. The success of a father or grandfather is far from being a proof that their practice in many respects cannot be improved upon, though that kind of argument is sometimes advanced. Their success should rather be attributed to their industry and skill, in the exercise of which they availed themselves of the best lights their time afforded them, than blindly treading in the footsteps of their predecessors. If unreflecting prescription had been the rule, what would agriculture be at this day? In the great majority of instances the vast loss that has hitherto occurred in neglecting the management of manure, must be attributed to the farmer not knowing the nature of the essential substances of which it is composed, and that the most valuable parts could escape as an invisible gas, or flow away dissolved in water. When his liability to loss in this way comes to be fully appreciated, and he becomes aware of the extent to which it is incurred in the ordinary and negligent methods of treating dung, a better system will be adopted, and no pains will be spared to preserve such valuable materials.

That even the most enlightened and intelligent of practical farmers have yet very much to learn on the subject of manures, is abundantly testified by the confusion of opinion that generally prevails on the application of certain individual salts, and the wonder often expressed of their success in one instance and their failure in another, in cases where the soil appeared to be the same. Nature is our great guide and instructor in these matters, and if we inquire of her she will give true and most valuable answers. Liebig has beautifully observed, "that experiments are questions put to nature, and the results of those experiments are her answers." The chemist has put such questions to nature respecting the composition of plants and their seeds, and she has answered him, "that they are formed of certain bases called by him earths and alkalis, united with certain acids, and of certain gaseous substances, the nature of which earths, alkalis, acids, and gaseous matters, she had previously explained to him."

The same question has been put respecting the composition of the dung and urine of the animals which have been fed upon plants and their seeds, and the answer has been, what might have been expected, "that they consist of precisely the same substances, only in an altered form." The chemist naturally inferred that these substances are the food of plants, and that they cannot exist without them; nay more—that if *all* of them are not present the plant cannot be formed, any more than a house can be formed without timber, though all the other materials are at hand in abundance. But the farmer has not listened to his lore, and would none of his counsel. Without knowing of what his plants are formed—that many different substances are required for their nourishment, and that the presence of all those substances is requisite to the *fulfilment of the condition of their* *growth*—he applies one substance only, an individual salt; and if it *happens* to be the very substance that was wanted to fulfil the conditions of fertility, he gets a crop. Encouraged by this success the same salt is applied to another field, with the full confidence that it will produce a similar effect. In this instance, however, to the great surprise and disappointment of the farmer, it proves an entire failure. Induced by the success of the first application, other persons try the same salt, some with entire success, others with partial benefit; but the great number generally without any perceptible advantage.—Further experience of this kind plainly proves that there is no dependence to be placed upon this particular salt, and it is ultimately abandoned. Such has been the fate of several different salts in succession, and thus common salt, gypsum, carbonate of soda, nitrate of soda, and nitrate of potash have each had their periods of favor and disrepute. A few successful experiments with a particular salt have led to an extensive application of it, and to consequent great loss and disappointment.

Neither plants nor animals can live unless their food contains all the elements of which their substance consists. If a dog be fed upon flesh it will enjoy vigorous health, but if jelly alone be given it for food, which constitutes only a part of the flesh, it soon dies with all the appearance of starvation. Again, it will live and do well when fed with undressed wheat flour, but rapidly declines if kept upon fine flour, from which all the bran has been taken. When the farmer applies farm-yard dung to his plants, it is like giving flesh to a dog; he administers all that the plants want to insure their growth; but when he applies a single salt, it is like giving only jelley or fine flour to the dog: at all events he throws himself upon the chance and uncertainty of all the other salts or substances which plants require for their food being already in the soil. No wonder, therefore, that such empirical practice should so frequently fail.

When the farmer stands in need of a substitute for his own proper manure—farm-yard dung—as he cannot with certainty tell what is in the land, he should obtain one that contains, if not all the substances contained in that dung, at least those which are most likely to be deficient; and these in ninety-nine cases in a hundred will be *nitrogen, in the form of salts of ammonia, phosphate of lime, and magnesia* (bone earth), *and potash.*

Night-soil with urine contains all of them, but the two first in greatest quantity, and wood and peat ashes yield potash, but the former in the greatest abundance. Many soils contain sulphate of lime *(gypsum)*, and most soils have a sufficiency of common salt *(muriate of soda)*, particularly in places near the sea; and it is on this account that they often fail, when separately applied as manures, to produce any effect: their failure is the answer of nature to the experimental inquiry of the farmer—that such are not the substances wanted in the soil. Oxide of iron, magnesia, *carbonate of lime*, silica, and alumina, as they constitute the bulk of all the soils, are neither of them scarcely ever so deficient as to be wanting for the mere food of plants. With the exception of oxide of iron and magnesia, their chief value depends upon their mechanical properties, in giving a due consistence to the soil, for the admission of air, and the retention of moisture.

Before concluding these observations it should be noticed, in confirmation of the views above taken of the application, or rather the substitution, of single substances for farm-yard manure, that even bones and substances abounding in ammonia often deceive the expectation of the farmer. The former have lately failed extensively on the estates of the Duke of Norfolk, owing, most probably, to that manure having been used frequently for a long time back, till the land had abundance of it, while other substances had been exhausted. It was used till the land had, to use a common expression, "become sick of it;" which indeed really means—that the land wanted no more of it, but was deficient of some other substance, perhaps potash, or salts of ammonia. Professor Liebig mentions an instance of a similar failure of a vineyard from the exclusive use of horn shavings, which is generally known to be a very powerful manure. The vines grew with great luxuriance, and bore plentifully for a few years, and then suddenly and entirely failed, probably owing to the complete exhaustion of the potash of the soil. Had wood ashes been mixed with the horn shavings, there can be very little doubt but the vines would have continued in full bearing.

CHAPTER IV.

Liquid Manures.

In England, the use of Liquid Manures is by no means general; and this is chiefly owing to the circumstance that much dry fodder and litter is afforded to cattle, which is capable of absorbing the urine, and the whole is used together. But as there may be situations which admit of a different practice, we shall state from Sprengel's work on Animal Manures the method pursued in Switzerland and other countries on the continent, for the preservation and application of this kind of manure, or rather of manure consisting of the liquid and solid excrements of cattle without the litter.

"In some districts, chiefly on the lake of Zurich, as well as in the west of Germany and Holland, they have for a long time been in the habit of mixing the fluid and solid excrements of cattle with a large quantity of water, in trenches and tanks prepared especially for their reception, and leaving the compound, before applying it for the purpose of manuring fields and meadows, to putrefy for a given time, giving it then the name of '*gulle*.' The Swiss have a mode about to be described of adapting the stalls in which the cattle are kept to the particular purpose of preparing the gulle. In the south-west of Germany, on the contrary, the method employed is to construct the tanks for the gulle in the fields, convey the solid and fluid excrements into them, and mix them in the tanks with water, which they conduct from neighboring springs, and thus save much trouble in the conveyance of water.

"In Switzerland, where the preparation of gulle has been longest in use, the cattle stand on a floor covered with planks, bricks, or tiles, and having a slight inclination towards their heels, where a horizontal trench for receiving the excrements runs from end to end. This trench is formed of boards or walling, $1\frac{1}{2}$ foot wide and 2 feet deep, emptying its contents into a tank lined with boarding, 6 or 8 feet deep, and of the same length and breadth, situated either in the cow-house itself, or close to it, and covered with a lid. The horizontal trench being in the first instance half filled with water, the urine runs into it of itself, and the animals drop a part of their solid excrements into this trench, the space allowed for them to stand on being so short that their hind quarters are close upon the edges of it, so much of it as does not fall into the trench being several times a-day raked in, and the surface well washed with water. The straw litter, which has become foul with excrement, is twice a-week removed from under the animals, and thrown into the trench, and having been there well stirred backwards and forwards with the dung-rake, is taken out. After it has been in this manner freed from the solid excrement attached to it, and thoroughly washed, it is laid at the edge of the trench in small heaps, in order, in the first instance, to drain out the superfluous liquid; it is then carried out of the building, and formed into regular four-cornered heaps, becoming in a short time so wholly decomposed as to be converted into a dark-brown fatty manure, which possesses, however, (as may be seen in Switzerland), no particular efficacy, deprived, as it has been, of the best portions of the excrement.

"After the first washing of the litter the trench is again two-thirds filled with water, and again in the course of three or four days, the fresh straw, rendered foul with excrement, is washed and put aside as before. The trench being at length quite full of liquid, it is well stirred up, the sluice-gate raised, and the whole contents allowed to drain into the tank. The same operations are repeated as long as the tank will allow. In large establishments they now convey or pump the already fermenting gulle out of the tank into a larger reservoir, situated either within the building or outside of it, and before leading it to the fields they allow it to remain in this reservoir until the fermentation is over, which generally takes place, according to the temperature of the air, in from four to six weeks. When the gulle is applied as a top-dressing we must take care that in pumping it into the barrel in which it is carried into the field no agitation takes place, otherwise the undecomposed particles, consisting of vegetable fibre, will lie upon the leaves of the young plants, and produce an injurious incrustation.

"In summer it should be applied only in wet weather, otherwise the plants, when the soil is dry, will receive too concentrated a nutriment, and consequently become rather worse than better. We might indeed obviate the evil by a greater dilution of the gulle with water, but the labor of carting it out to the field would then become too much increased.

"On account of the labor of carriage, the gulle, generally speaking, can only be applied to fields and meadows which lie near the homestead, unless you proceed with it as they do in the Black Forest, where the gulle-pits are made in the fields and meadows, or close to them. The most indispensable requisite in the preparation of gulle, as we may easily suppose, is a sufficient supply of water, and that water is best adapted for the purpose which holds a large quantity of saline particles in solution, for then the soil obtains additional substances which afford nourishment to plants.

"In the Black Forest they always add some green copperas (*sulphate of iron*) to the fermenting gulle in their tanks, experience having proved that this substance very much strengthens its manuring properties. Of this effect indeed we cannot have a doubt, since by its means a portion of the ammonia developed by the urine becomes chemically combined with the sulphuric acid of the copperas, and the resulting sulphate of ammonia, as we know, is one of the strongest saline manures.

"Now, although the arrangements of the cattle-stalls, as well as the numerous tanks required in the preparation of the gulle, in order to preserve it for the proper period, occasion much expense, and likewise its distribution over the fields much labor, these outlays are richly repaid by the advantages derived from this manure, as will be more clearly shown under the following heads:—

"1. The water which is constantly kept in the trench absorbs much of the carbonic acid given out by the cow in the act of breathing; and consequently, the ammonia arising from the urine is not only neutralized, and thus rendered less volatile, but the carbonic acid is also itself a strong manuring substance.

"2. The water in the trench serves to keep the cow cool during the heat of summer, and the vapor occasions a dampness in the atmosphere, which is much better for the health of the cow than a hot and dry air.

"3. Little, or perhaps none, of the ammonia developed by the urine is lost, its escape being prevented, as my own experiments on the putrefaction of urine have proved, by the large quantity of water present. The absolute of manuring element from this circumstance is, indeed, very considerable, and fully confirms the statement of the Swiss, that since the time of the introduction of gulle, agriculture has been considerably improved.

"4. By means of the gulle a sickly plant derives almost immediate relief, in consequence of all the nutriment being already dissolved by the water, and in a fit state to enter the plant at once.

"5. It is a point of particular importance, that in adopting the use of gulle, a quicker return on the outlay of capital is obtained than in the case of common yard dung.

"6. From the gulle little or none of the manuring is carried off by the rain, while from yard manure it frequently happens that much is lost, the practice of spreading it on the field in heavy dressings causing its action to continue during three or four years, or even longer.

"7. By means of gulle, plants may be brought with most certainty to the exact degree of luxuriancy which will yield the most abundant produce.

"8. The growth of foarge plants, particularly of clover and the meadow grasses, is greatly secured by the application of gulle, particularly when (as they do in the Black Forest) we add green copperas to the putrefying gulle, and the stall-feeding of cattle is made more practicable.

"9. Lastly, in adopting the preparation of gulle, less litter is required. When cattle are not properly bedded, much of the manure escapes in the form of gas; while by mixing the excrement with a large quantity of water, little or none of it is lost: it is, consequently, evident that in the preparation of gulle a greater quantity of manure is gained than in that of common yard dung; and what is the most important point is, that the gulle has retained a larger proportion of that very substance which has the most important influence in the nourishment of plants, namely, ammonia."

"In fact, all the advantages derived from the preparation of gulle are so important, that we cannot but wish that comparative experiments may be made, in order to ascertain with more certainty what is the real amount of gain in its adoption. It might, perhaps, be useful also to prepare gulle from horse and sheep dung; as, under the present management of these manures, far more ammonia is lost by evaporation than in the case of cattle dung.

"The gulle is conveyed to the field in a barrel, placed upon a wagon with iron axle-trees, since wooden are soon decayed by being splashed with the liquid. The wheels should have broad felloes, in order not to cut deep when drawn with the gulle over green crops, pastures, and meadows. The flow of the gulle from the barrel is best effected by a hole made underneath it, in the centre. Under the hole hangs a board, on which the liquor splashes, and so distributes itself in every direction in the best manner possible."

We have quoted this part of Sprengel's excellent work on Animal Manures, from the translation given in the Agricultural Journal; and we have been the more particular to give it without abridgment, as it affords a practical comment upon much that we have said on the preservation and economical management of manure, and of its liability to be wasted by neglect. If the practice of the Swiss and the German farmers of the Black Forest have not been directed by the chemist, it is very remarkable that it is exactly in accordance with scientific principles, and is entirely approved by Sprengel, who is one of the most eminent chemists of Germany, and who has devoted many years to this particular branch of science.

Whatever may be thought of the advantage and practicability of adopting this method of management in this country, certainly many valuable hints may be derived from the details given above, which are rendered the more worthy of attention because, as it appears, the Swiss farmers have abandoned the practice of allowing the litter and dung and urine to remain together, from a conviction that much of the more valuable material, and particularly the ammonia, was washed by that method, and must have encountered, upon that conviction, very considerable expense in making the necessary arrangements for what they conceived a more economical method of preserving and managing their manure.

In many parts of the continent, and more especially in Belgium, some portions of Germany, and Switzerland, there appears to have been much more attention paid to the subject of manures than in England; and the farmers of those countries appear to be more alive to its great importance. They also appear to understand better the true nature of manures, and on what substances their nourishing property depend, and to have adopted in consequence the most efficient methods of preventing waste, and applying them in the most beneficial manner to the soil.

CHAPTER V.

Quantity of Farm-yard Manure produced by Crops—Composts.

It has been calculated, by an eminent Scotch agriculturist, that the *Farm-yard Manure*, produced per acre by the several crops, is in quantity nearly as follows, from land producing 28 bushels of wheat:—

	Tons.
By turnips, cabbages, and fallow crops, when applied to the feeding of cattle, - - - - - - - - - - -	6
" Clover, grass, or herbage, hay, &c., first year, - - -	6
" Ditto, if mowed, second year, - - - - - - -	5½
" Pulse crops, as beans, &c., part of the seed being used on the farm, - - - - - - - - - - -	5
" Pulse crops, when the seed is sold, - - - - - -	5
" White or corn crops—wheat, barley, &c. on an average of the whole, - - - - - - - - - -	4

It is no wonder, therefore, observes this writer, "that green crops should be recommended as sources of fertility, producing proportionably much more manure, besides the other advantages wherewith they are attended." This quantity might, however, be very much increased by the means before alluded to—that of supplying the cattle-yards with peat and other rough vegetable substances, which, by care and industry, can be collected.

Another method of increasing the quantity of effectual manure in a very great degree is that of forming Compost; by which the farm-yard dung is preserved, and a most valuable addition made to its fertilizing principle: particularly where peat is easily obtainable.

The following method of making *peat compost* is given by Mr. Aiton, in his treatise on peat earth, as inserted in Sir John Sinclair's Scotch Husbandry:

"The peat and dung must be thrown up, in alternate strata, into a heap about four feet and a half high, and in the following proportions: peat, six inches; dung, ten inches—peat, six inches; dung, four inches—peat, six inches, and then a thin bed of dung, and cover the whole with peat. The heap should be put loosely together, and then made smooth on the outside. The compost, after it is made up, gets into a general heat, sooner or later, according to the weather and the condition of the dung: in summer, in ten days or sooner; in winter, not perhaps for many weeks if the cold is severe. It always, however, has been found to come on at last; and in summer it sometimes rises so high as to be mischievous, by producing what is called *fire-fanging*.

In that season a stick should be kept in it in different parts, to pull out and feel now and then; for if it approaches to blood heat, it should be either watered or turned over; and on such occasion advantage may be taken to mix it with a little fresh peat. The heat subsides after a time, and with great variety, according to the weather, the dung, and the perfection of making up the compost, which then may be allowed to remain untouched till within three weeks of using, when it should be turned over, upside down and inside out, and all the lumps broken; then it comes into a second heat, but soon cools and is taken out for use. In this state the whole, except bits of decayed wood, appears a black free mass, and spreads like garden mould. Use it weight for weight, like farm-yard dung, and it will be found to stand the comparison.

Let it be observed, that the object of making up the compost is to form as large a hot-bed as the quantity of dung employed admits of, and then to surround it on all sides, so as to have the whole benefit of the heat and effluvia. Peat, nearly as dry as garden mould, in seed-time, may be mixed up with the dung, so as to double the volume and more, and nearly triple the weight, and instead of hurting the heat, prolong it.—A correspondent of Sir John Sinclair's states that he has used this compost for seven years, and considers it to be of immense importance. He would rather bring peat for two or three miles than want it for his compost hills.

In this process of making compost, a large quantity of almost inert humus is broken down and rendered fit to yield abundant nourishment to plants, both in the shape of carbonic acid gas and also saline matter; while the ammonia, produced by the fermentation of the dung, is absorbed and retained by the humus.

In all cases where peat can be had for the purpose of making compost, experience has shown there can be no question about the propriety and advantage of using it for that purpose. The effects of peat-ashes are well known; and in this case the saline and earthy substances, of which they are composed, are made available as well as the humus, which is retained instead of being dissipated, as in the case of burning.

It often happens that all the dung upon a farm cannot be used at the most fitting season, and must be kept for a future occasion; much care is therefore required to prevent its being wasted, either by fermentation or from the effect of water. The method above noticed of mixing the dung with peat can be practised only in particular situations, but every situation admits of the formation of COMPOST HEAPS by means of mixing earth of some kind or other. It is usual to form compost by mixing the dung with any kind of soil that happens to be most convenient; but it is by no means an unimportant question as to what kind of material is the best for the purpose. The muddy deposit of tideways, the sediment of ponds, and the scouring of ditches, are the first to be recommended; next, calcareous road scrapings, marl, and clay. In making an earthy compost with dung, there is a three-fold object answered: first, to prevent the too rapid decay of the dung; secondly, to present an earthy substance to the slowly decaying matter which is capable of uniting with it, and preserving the ammonia; and thirdly, to afford some addition of saline matter, which most earths contain. The most finely divided earths are, of course, the best adapted for these purposes, and perhaps a rich marly earth should be preferred to any other, from its known fertilizing qualities, while there is considerable uncertainty in that of the other materials mentioned. It is seldom, however, that much choice can be exercised. In forming a compost heap, a bed of the earth should be first laid down, about six inches deep, and then a layer of dung about a foot deep, lightly and regularly laid upon the earth. Let the alternation be repeated until the heap is about five feet high; a thin covering of the earth, both on the top and sides, completing the whole. In about ten weeks the heap should be turned and well mixed, and again covered with a slight coating of fresh earth.

Wherever *night-soil* can be obtained in any quantity, the forming it into a *compost*, so as to preserve it from waste and render it fit for the drill, is an object of great importance, as it is much too powerful to be used in the crude state, and indeed cannot be conveniently distributed in that condition. In China, this most valuable material is mixed with fat marl, formed into cakes, and then dried in the sun, and in this state is transported to great distances by means of the numerous rivers and canals which intersect that country. The great diligence with which this manure is collected, and the extraordinary pains bestowed in its preservation by these most skilful cultivators, is of itself the most convincing proof of its extraordinary fertilizing properties. The Chinese adopt the plan of preserving this manure above mentioned, chiefly because it presents the most convenient method of transporting it to a distance; but the object of the English farmer is to render it available for his own use, as the best manure that England affords for application by the drill.

The best mode of treating night-soil for the purpose intended is to mix it with about double its bulk of charred or half-burned peat, which will arrest its decomposition, and by so doing render it inoffensive. *Dried peat*, reduced to powder, or *peat-ashes*, will either of them have nearly a similar effect, though the first is preferable if it can be procured. When peat cannot be obtained, finely sifted coal-ashes is a good substitute; or even the ashes produced by paring and burning the surface of rough clay land.

In situations where *kelp-ashes* can be procured, it would form an excellent addition to any of these mixtures, as it would supply those salts in which night-soil is rather deficient. Lime should in no case be resorted to, as it very much injures its quality by driving off ammonia. The materials should be well mixed, and spread either under a shed, or in the open air, until dry enough to be riddled for the use of the drill. In order to promote the drying, the compost should be frequently turned over. About 20 bushels of such a compost will be a powerful dressing for an acre of land. We have already mentioned a compost of peat and farm-yard dung.

Whenever both peat and lime are available, they form a very good compost for manuring pasture land. The mode of preparing this compost may be performed in the usual way of alternate layers, the peat being used in a double or triple proportion to the lime. The heap should be suffered to remain three or four months, during which time it should be turned and well mixed. The lime acts very powerfully upon the inert fibre of the peat, and renders a large portion of it soluble in water, and in a fit state for becoming the food of plants.

Any refuse animal matter can of course be employed in a similar manner. The carcase of a dead horse, which is often suffered to pollute the air with its noxious effluvia, has been happily employed in decomposing twenty tons of peat-earth, and transforming it into the most enriching manure. Night-soil may be composted with peat with great advantage. Many volumes have been written on the subject of composts, as substitutes for farm-yard dung, and yet the true principle upon which they should be formed does not appear to have been clearly inculcated and insisted upon. Farm-yard dung is certain in its effect, because it contains all the elements or substances which plants require for their food ; and those composite manures which contain the greatest number of the more essential substances are the most likely to act with corresponding uniformity.

CHAPTER VI.

Materials and Effects of Composts.

When, in the formation of composts, we burn farm-yard manure by its too great fermentation, we dissipate the carbon and the elements of water which form the woody part and constitute the great bulk of the manure, and the nitrogen, or ammonia ; the loss of the former is but of little consequence, but the ammonia is very important and with the ashes constitutes the most essential part of farm-yard dung. These, therefore, are the substances of which portable composts, or factitious manures, should principally consist.

A perfect composite manure, or portable compost, should therefore contain salts of ammonia, potash, soda, lime, and magnesia, formed by the union of those bases with carbonic, sulphuric, muriatic, and phosphoric acids, namely, carbonate of ammonia, carbonate of potash, sulphate of lime, phosphate of lime, and magnesia, *(bone earth,)* and muriate of soda *(common salt.)*

In the substances used it matters but little how the acids and bases are combined, so that we have in the total sum all the acids and all the bases. Silica, alumina, and oxide of iron have not been taken into account, because they are abundantly furnished by almost all soils. There is no necessity, nor is there sufficient ground for giving the proportionate quantity of each separate salt, for the requisite quantity of each will ever vary according to what the land already contains of them, and the several crops in a rotation require; but there are certain of them which are more liable to be exhausted than others, and therefore these we should be the more careful to supply in the compost. These are the salts formed by any of the acids with ammonia; by any of the alkalis, or alkaline earths, with phosphoric acid; and by any of the acids with potash. This observation will appear the more forcible when we consider the great quantity of these substances which are yearly carried off a farm in the shape of cattle, sheep, wool, and corn; the three first of which contain phosphate of lime and magnesia, with nitrogen, or ammonia in abundance, and the latter both nitrogen and potash. They are seldom or never, therefore, too abundant in the soil; but, on the contrary, they are almost always the substances which are most wanted or deficient.

It is owing to the constant exhaustion of these substances by corn crops and cattle, and the slowness with which they are supplied by the hand of nature, through the medium of green crops and fallows, that, when applied separately, they often produce such surprising effects, of which we have proximate instances in the effect of soot, which contains much ammonia; and bone-dust, which consists chiefly of phosphate of lime and magnesia. It is well known what powerful effect a solution of potash produces upon the growth of grasses and clover. The salts of soda and sulphate of lime, though no less indispensable to plants than those above mentioned, are of rather less importance in composts only because they are more liberally supplied by nature, and are found in greater or less quantity in most soils. As, however, we cannot be certain of their presence in sufficient abundance without considerable chemical skill, the safest way is to add them in the shape of common salt and gypsum.

According to these views, and what has been said in a former part of this work, it will be easily understood that a much greater certainty of effect might be expected from a mixture of bones with soot, salt, and gypsum, or, instead of the latter, with peat or coal ashes, than from bones only; and that there would be still stronger assurance of the effect of a mixture composed of bones and soot with kelp-ashes, or, in default of the latter, with common salt and gypsum with wood-ashes, or otherwise with peat-ashes. The powerful effect of night-soil with urine, and of guano, the most fertilizing compounds provided by nature, is explained by a comparison of their composition with that of vegetable and animal substances. A master hand has lately withdrawn the veil that has hitherto hung over this important branch of agriculture, and has fully explained "what manure is," and whence derived.

CHAPTER VII.

Application of Manures to the Soil.

THE powerful effect of *Bone-dust* upon almost every soil to which it has been applied admits of an easy and satisfactory explanation, by the consideration that it is, generally speaking, less abundant in soils than any other of the mineral substances required as the food of plants, and is annually carried away in great quantities in the shape of corn, cattle, and wool; by which the most fertile soils must, in time, become exhausted of that indispensable substance. Less every year is returned to the soil by the ordinary manure of a farm than has been taken from it, and a corresponding diminution of produce ensues; thus the great increase produced by the application of this part of the food of plants only, is the surest proof that it had previously become deficient.

Of the *mineral substances* potash is the next most likely substance to be exhausted; for although it is slowly yielded by the disintegration of the soil, from exposure to the weather in the operation of fallowing, yet in most cases it is carried off much faster than it is thus supplied, and the deficiency is made manifest by the often astonishing effect produced by dressings of wood, fern, or other vegetable ashes. The continual drain of these two precious materials, so indispensable to fertility, claims the farmer's most serious attention. Muriate of soda, *(common salt,)* sulphate and carbonate of lime and iron, though equally indispensable to plants, are much more abundant, and, in many cases, inexhaustible; and it may be confidently asserted, that the failure of both corn and green crops is more frequently owing to a deficiency of bone-earth and potash than of any other substances required by plants. These observations are borne out by the present state of a large portion of the land in the maratime or Atlantic States of America, once so remarkably fertile, and considered by the first settlers as inexhaustible. The fertility of these states has been so much reduced by continued cropping with corn and tobacco, by which both potash and the phosphates are carried away, that they will now no longer bear these crops without heavy and repeated manuring. The same diminution of fertility in grain has been experienced in the south of Europe and the north of Africa, which, in very early times, were subjected to cultivation, and for many centuries sustained an immense population. The long-continued consumption of corn and cattle in Rome, and other large cities, drained off the most fertilizing substances of the soil to such a degree as to render it comparatively sterile. The same injurious effect must be produced in every country where the like causes are in operation, and where drains and rivers are allowed to carry off the most precious and fertilizing principles of the soil, as is at present the case in England; and this injurious consequence, though it may be protracted for a time, cannot be averted by the most skillful and judicious management in other respects. The pressure of population on the means of subsistence has long taught the Chinese the necessity of strictly preventing the waste of any fertilizing substance, and their care and diligence in this respect reproaches the negligence of the civilized nations of Europe, who are often afflicted by scarcity of food, while they waste the means of securing it in abundance.

The intelligent farmer cannot fail to be convinced that those artificial manures which are the most actively effective, seem to follow the same rule which prevails in the growth of plants—in which rapidity of growth is ever followed by early decay; and are therefore best when applied to heavy, sluggish soils—while those of the alkalis, like chalk and marl, are more profitably made use of on the lighter lands.

The principal advantages that *farm-yard dung* possesses over *artificial manures*, have been already stated; namely—that it contains *all* the elements of plants; is more attractive of moisture; and by its decomposition of the soil, produces an increase of temperature. To these may be added its more permanent effect. Artificial manures, though they are less perfect, and generally more transient, are more forcing in the early stages of the growth of plants. These qualities may be united with excellent effect, by using both with the same crop, and especially with the turnip crop. A gentleman in the north of Ireland found the greatest benefit from using about half the usual quantity of farm-yard manure, and drilling with the seed less than half the prescribed measure of Poittevin's manure. His turnips grew with great vigor, and obtained the prize given by the local agricultural society; nor can there be much doubt that the practice would be beneficial if adopted with any of the approved manures now coming into use.

In the application of dung alone it may be almost needless to remark that, when reserved for the *wheat crop*, to be placed upon a fallow of clover stubble, the heaps should receive an additional turning, the more effectually to destroy the seeds of weeds that may have escaped the effect of the first fermentation, as these cannot, as in turnips, be ridded from the growing crop, especially when broad-cast. In the case of manuring upon the clover stubble, it is a much preferable practice to prepare the dung as a compost, and apply it immediately after the first crop of clover is cut, which will produce a larger second crop, and a greater development of the roots for the benefit of the succeeding wheat, with much less liability of injury from the seeds of weeds.

In the *application of dung to land intended for beans*, only such a degree of fermentation is required as to allow of it being regularly spread and covered by the plough. There is, indeed, but little time for fermentation, as the bean is frequently sown in January, and never later than in the months of February and March ; but when beans are either drilled or dibbled, so as to admit of the effectual operation both of the horse and hand-hoe, every weed may be effectually destroyed ; and the protracted decomposition of the dung in the ground, in contact with the roots of the plant, keeps up a continual supply of food and of temperature. Sir H. Davy advocates the application of unfermented straw—so far as practicable—upon the principle recognised by all chemists—"that the elements of vegetable and animal substances enter more readily into new combinations at the instant of their separation from the old, than at any time afterwards ; which is promoted by the heat that always accompanies, or is produced by decomposition." Indeed, fermentation above ground must always be attended, however carefully managed, with a very considerable dissipation of valuable matter ; and—notwithstanding the observations of Von Thaer, hereafter quoted—must be considered rather as an expedient than a desirable preparation.

In advocating this principle, Sir Humphrey should, however, have applied it only to those crops which are evidently benefited by its use. Turnips, for instance, require well-rotted spit-dung, for the purpose of pushing forward the plants, to furnish a large bulk of roots for the feeding of sheep ; which again reproduce it, in the shape of manure for an ensuing crop of corn : thus affording a double quantity, and that immediately before the seed is sown. To beans, however, only one dressing is applied both for the present and future crop of wheat, for which the greater portion of nutriment should be reserved. In order, therefore, to effect that essential object, the manure should be put into the ground when only slightly, if at all, fermented ; allowing it to decompose, while in the earth, by the gradual process of time ; and, for many reasons, we should recommend it to be laid upon the land during the course of autumn and winter.

First. If the soiling system has been carried on, all the dung made by the cattle during summer will have been formed from green food and roots, and the manure will be in a more fit state for use at that time than if kept for the bean-sowing season.

Secondly. It can be carted upon the soil when the land is in a dry state, in which it will not be injuriously affected by the poaching which so frequently occasions mischief when the ground is wet, and which, on heavy clays, sometimes seriously impedes the sowing of beans ; and it may be done after wheat seed-time, when the teams are more at leisure.

Lastly. If the manure be immediately ploughed under, it will be sufficiently rotted ; and it will afford the material advantage of admitting the beans to be sown at an earlier period.

In the districts where the *folding-system* is practised, and the land favorable for the cultivation of beans and peas, it is a good method to spread or litter the fold, with rough strawy manure, which receives the droopings, and with them is trodden into the ground, and ploughed down as soon after as the course of the fold will permit. By this means very little of either the volatile or more fixed substances are wasted. Such practice is not only economical with regard to manure, but is also very favorable to the sheep at the inclement season of the year in which it must take place.

In the *application of farm-yard manure to the potato crop*, no fermentation is necessary; for, as this plant is cultivated in trenches, and the mould lightly thrown over them, the manure rapidly decomposes—and the potato requires, more than any other, as much humus as can be given it, that is, decaying vegetable matter. It is chiefly on this account that the potato succeeds best in new soils, in which humus abounds, and which, in consequence, produce it of a fine mealy quality; while it becomes waxy and disagreeable upon old and clayey soils, which are deficient in humus.

When *potatoes* are cultivated upon a large scale, the operation is very similar to that described of sowing turnips, in which the trenches may be made either at one operation of a double-breasted plough, or by a single plough, by what is called "a bout," or going and returning; the dung is then carted and spread in the trenches, and the potato set afterwards thrust through it, so as to rest upon the ground, by which means it is less likely to be disturbed in the operation of covering, which should be done by the hand-hoe.

We must, however, admit that there is much difference of opinion as to the best mode of putting in the manure for potato crops; for although long stable-dung, in a fresh state, is very commonly used, and most generally in drills, some put it *under*, and others *over* the sets. M. Dimmery, of Stinchcombe farm, in Gloucestershire, who plants them on a large scale, uses nothing but soot, which he puts in the drills at the rate of twenty-five bushels to the acre, and applies in the following manner:—

"The drills being formed, a man follows with a basket of soot, and sows it in the bottom and sides of the drills with his hand, walking up the middle of the ridge, and throwing first a handful of soot to the right, and then a handful to the left. The potato-sets are then planted by women and boys in the bottom of the drills, ten inches apart; and, as the seed is deposited in the drills, a man follows with a hoe, about eight inches wide, and covers the seed by drawing the earth from the space between the drills, covering the potatoes which are planted by raising the earth higher over them than it is between them; and the earth being very loose, this is easily accomplished. By which mode of covering, it will be perceived that the whole of the soot does not come in contact with the seed, but is so placed as to give nourishment to the young roots."

With regard to the application of muck to *meadow-land*, fresh stable-dung has a powerful effect when laid upon grass, either immediately before the grass begins to shoot in the early spring, or immediately after the scythe; but, in both cases, the long straw should be raked off and returned to the yard as soon as the grass has made a little progress. By that time much of the straw will have been drawn in by the worms; the showers and dews will also have carried down the small particles and the soluble salts to reach the roots of the plants, and the haulm which remains may be raked off, and again employed as a receptacle for dung and urine.

The plan of laying long stable-manure on grass-land is indeed not only very commonly adopted in this country, but also strongly advocated in the "*Principes raisonnes d'Agriculture*" of the late Baron Von Thaer—which is, perhaps, the best practical work on the subject ever published, and which we regret not to have already seen in English. It says, indeed, that "from a great number of comparative experiments made both by himself and other agriculturists, it appears to be established beyond doubt, that dung which has passed the highest point of fermentation, when it is laid upon the land—even in the hottest and driest weather—*not only loses nothing, but gains in quality.*"

It is generally thought that dung must necessarily lose by evaporation; and at first sight, this appears so plausible a conclusion, that it has been universally recommended to plough in farm-yard manure, upon arable land, as soon as it is spread. In this, however, the work states—"That the Baron was himself of that opinion, when his attention was drawn anew to the subject by the practical observations of some large farmers in Mecklenburg, from which it appeared that probably the evaporation from rotten dung is not so great as it seems to be; for although, on its being first carried out, it exhales a strong musky smell, yet this evaporation cannot in any case be avoided, and, after a short time, it both ceases to smell, without losing any thing in weight." Which statement we have known confirmed by several experienced farmers, who spread the dung upon the stubbles and clover-leys, immediately after the crop is carried, and allow it to remain there till the preparation for spring sowing; and is found to act more powerfully when managed in this manner than when ploughed immediately into the soil: thus, if the results be more beneficial than that of the usual mode, palpably contradicting the theory of animal and vegetable manures, as taught by chemists.

CHAPTER VIII.

On Farm-Yards and Dung-Heaps.

HAVING thus submitted to our readers all that occurs to us of importance on the subject of *farm-yard manure*, we shall here recapitulate a summary of the chief points which we deem particularly worthy of their consideration.

1. To bottom the farm-yard with furze, fern, dry haulm, or any

other loose refuse that takes the longest time to dissolve, and over that to bed it deep with straw.

2. To occasionally remove the cribs of store cattle to different parts of the straw-yard, in order that their dung may be dropped, and their litter trodden equally.

3. To spread the dung of other animals, when thrown into the yards, in equal layers on every part.

4. To remove the dung from the yard at least once, or oftener, during the winter, to the mixen.

5. To turn and mix all dunghills until the woody or fibrous texture of the matter contained in them, and the roots and seeds of weeds, be completely decomposed, and until they emit a foul and putrid smell, by which time they reach their greatest degree of strength, and arrive at the state of spit-dung.

6. To keep the dung in an equal state of moisture, so as to prevent any portion of the heap from becoming fire-fanged. If the fermentation be too rapid, heavy watering will abate the heat; but it will afterwards revive with increased force, unless the heap be either trodden firmly down or covered with mould to exclude the air.

7. To ferment the dung, if to be laid on arable land during the autumn, in a much less degree than that to be applied before a spring sowing.

8. To lay a larger quantity on cold and wet lands than on those of a lighter nature, because the former require to be corrected by the warmth of the dung; while on dry, sandy, and gravelly soils, the application of too much dung is apt to burn up the plants. Stiff land will also be loosened by the undecayed fibres of long dung, which, although its putrefaction will be thus retarded, and its fertilizing power delayed, will yet ultimately afford nourishment.

9. To form composts with dung, or other animal and vegetable substances, and earth, for application to light soils.

10. To spread the manure upon the land, when carried to the field, with the least possible delay; and, if the land be arable, to turn it immediately into the soil.

11. To preserve the drainage from stables and dung-hills in every possible way; and, if not applicable in a liquid state, to throw it again upon the mixen.

12. To try experiments, during a series of years, upon the same soils and crops, with equal quantities of dung, laid on fresh, and afterwards rotted, in order to ascertain the results of their application to the land. The whole quantity to be first weighed or measured, and then divided.

The fermentation of farm-yard manure is, in fact, a subject of far greater importance than is generally imagined; for on a due estimation of its value mainly depends the individual success as well as the national prosperity of our agriculture. The experiments to which we point cannot fail therefore to come home to the interests of every man: they may be made without expense, and without any other trouble than the mere exercise of common observation and intelligence. Leaving aside, however, the discussion concerning the disputed worth of fresh or fermented—of long or short dung—let the farmer sedulously bend his attetion to the accumulation of the utmost quantity that it may be in his power to procure. The manner and the time of using it, in either state, must, however, be governed by circumstances which may not always be within his control; and every judicious husbandman will rather accommodate himself to the exigency of the case, than adhere strictly to his own notions of what he conceives to be the best practice. In fine, whether favoring the one or the other side of the question, let him collect all he can, and apply it carefully to his crops, and then, trusting to events, "*let the land and the muck settle it*."

CHAPTER IX.

Drill System.

If there be one fact more important than another in the *management of farm-yard manure*, it is this—that when the proper time comes for carting it upon the land, it should be carefully and immediately spread and covered by the plough. The most judicious and effective mode of applying such manure is that now generally practised in the northern counties of England, and many parts of Scotland, in the cultivation of turnips in drills, called the "Northumberland system;" a method so admirable for its precision and economy both of manure and labor, and so well adapted to secure that important crop, that it is quite astonishing that the broad-cast method continues yet so prevalent in the midland and southern counties. Although, perhaps, originally adopted along with many other modes upon the "old farming system," it must yet have been partly occasioned, and still continued, by the large accumulation of flints contained in otherwise good land, the strength and quantity of which stones effectually impede the operation of drilling, and compel the farmer to pursue the plan of broad-cast: but wherever the quality of the soil allows of drilling, we must admit that it is now practised by many intelligent farmers of the districts which have been alluded to.

It is well known to reading farmers that Jethro Tull was the first cultivator of turnips by drilling and horse-hoeing, though upon an erroneous principle; but it was not till many years after that this mode of culture was brought to its present perfection, and became the prevailing system of the north. For nearly half a century Tull's plan had no imitators, and was almost forgotten, when it was revived and improved by a gentleman of spirit and enterprise in farming, who reduced the intervals of the rows from 4 feet to 27 inches, and placed the manure in trenches. But though he constantly produced more regular, cleaner, and heavier crops than his neighbors who followed the old plan, no one for some time was disposed to follow his example, until at length a young farmer of more discernment than the rest, struck with the decided superiority of the crops, and the good effect of a more perfect cultivation of the land, took the lead, and soon induced his neighbors to tread in his footsteps. From that time the drilling and horse-hoeing system of cultivating turnips rapidly spread over the northern counties, though the march of improvement in that particular has moved with so very tardy a pace to the south, that it is still a novelty in many districts.

The plan adopted by the Royal English Agricultural Society, of holding their meetings in different parts of the kingdom, will have the effect of removing the prejudices that impede the progress of improvement by leading farmers to inspect the practice of districts remote from their own, and from which they have much to learn. The following is the plan we have ourselves practised, and which we believe coincides in all the leading particulars with that pursued in the best districts in the north.

The *dung-heap* being made upon one of the headlands of the field, in the manner before described, and the field being previously well fallowed, the operations are carried on by two double-breasted ploughs, drawn by two horses, driven by reins; three one-horse carts, a drill, preceded by a light roller, and drawn by one horse, three fillers, three drivers, and four or five light hands as spreaders. The leading plough opens the ground, producing trenches 27 inches apart; and as soon as five are produced, the dung-cart follows, the horse walking in the middle trench, by which the wheels are made to travel in the bottom of the two next adjoining. The dung is drawn out by a dung-hook, with as much regularity as possible, and at the rate of from 15 to 20 tons per acre. The spreaders then follow, distributing the manure evenly along the bottoms of the five trenches; the splitting or covering plough succeeds, converting the trench into a ridge over the dung, and this plough is soon followed by the drill. The horse walks in one of the new trenches, and the light roller presses down the tops of two ridges; the drill follows, drawn by a rope attached to an iron bar of the drill, by means of a ring: in returning, the ring is shifted along the bar to make the drill follow on the next ridge, while the roller covers the slight seam made by the drill upon the first ridge; in the next bout, and all succeeding, by alternately shifting the ring upon the bar, one ridge is flattened and drilled while the other is covered. Sometimes drills are used with two hoppers and a double roller, that is, one before the drills and the other after, by which two ridges are flattened, drilled, and covered at one operation, but the single drill is, in our opinion, the best.

In this way one set of people and horses will plough, dung, spread, and sow from three to four acres a-day. The many advantages resulting from this mode of applying dung must be obvious at first sight. In the first place it is more evenly distributed generally over the field, is covered up while yet reeking with the heat of fermentation, and gives an almost immediate impulse to the seed which is drilled upon or over it, from which results a rapid development of the plant, which thereby soon gets beyond the destructive attacks of the fly, and its roots striking into the dung insures a vigorous progress to maturity. In the mean time the land receives a thorough tillage by means of the united operation of the horse and hand-hoe, bidding defiance to weeds, and the individual plants are set out with all the regularity of garden culture. It should be observed the dung is never allowed to remain uncovered, even while the gang take their short repast upon the field, as the covering plough and drill continue after the spreaders have stopped, till the whole of the drills are covered and sown.

The contrast between the method above described, of dunging land for turnips in point of economy of labor also, and that still so commonly practised, is sufficiently striking. In the former case the whole operation goes on simultaneously; the strength of the farm being concentrated, the master can devote his attention to it, which, along with the co-operation of two or three steady workmen, keeps the gang in regular and constant progress: the trenches being opened, the dung-carts and spreaders are compelled, as it were, to keep moving, by being pressed upon by the closing plough and seed-drill; whereas when the dung hauling, and the spreading and ploughing in, have no necessary connexion, much time is lost by a languid progress of the work, and the result is, that a much less quantity of work is effected with the same number of men and horses.

CHAPTER X.

Effects of Lime.

Lime is very extensively applied, but more particularly in the north of England and Scotland, where the soil is for the most part derived from the older and primitive rocks, which is also the case in the greater part of Devonshire and the whole of Cornwall, as well as in Wales; and when we consider that, besides yielding potash, it is a corrector of acidity, a destroyer of sulphate of iron, and of insects and slugs, a powerful solvent of rough vegetable matter, and ultimately a valuable mechanical ingredient, especially in light sands and thin slaty soils, we establish its claim to more general use than it has yet attained.

The modes of *applying lime to arable land*, and the quantity used, vary very much in different parts of the country. There is, however, one maxim which should be common to all, and that is to mix it with the soil in as caustic a state as possible ; for on this depends its more active chemical effect.

The most convenient and economical mode of managing lime, when applied to arable land, is to deposit it unslaked, as it comes from the lime-kiln, in small heaps of three or four bushels each, to be laid regularly over the field, and covered immediately with a considerable quantity of the soil, by which it will in a few days be reduced to powder ; and as soon as the lime has become slaked it should be spread over the soil, and ploughed into the land, to mix it intimately with the earth. In rainy seasons much attention is required to avert the consequence of too much water, which, by making it run together in a mass, prevents it from being spread regularly over the land. This consequence is so serious that in Cornwall it is considered justifiable, even by scrupulous persons, to attend to the work on Sunday after a heavy rain.

The *quantity of lime* laid upon arable land varies exceedingly in different countries ; but as too much light cannot be thrown on this important subject, and as the application of lime has been more attended to, and carried to a comparatively greater extent in Scotland than elsewhere, we shall render the best service to the practical farmer by giving some extracts from a late eminent writer on Scottish husbandry.

There is no country in Europe where calcined lime is used to so great an extent, and in such quantities, as in the more improved and improving districts of Scotland. This may be partly owing to the total absence of chalk, which abounds in many parts of England, and which renders calcined lime less necessary there ; but it is principally to be attributed to the great benefit that has been derived from its use, which would hardly be credited were its effects not too correctly stated to be disputed. In bringing new, or maiden soil into cultivation, the use of lime is indeed found to be so essential, that little good could be done without it. Its first application in particular, gives a degree of permanent fertility to soil which can be imparted by no other manure. Maiden soils in Lammermuir, of a tolerable quality, will, with the force of sheep's dung, produce a middling crop of oats or rye ; but the richest animal dung does not enable them to bring any other grain to maturity. Peas, barley, or wheat, will set out with every appearance of success, but when the peas are in bloom, and the other grains are putting forth the ear, they proceed no further, and dwindle away in fruitless abortion ; while the same soils, when sufficiently limed, will, in good seasons, bring every species of grain to maturity.

This fact proves that oats and rye require less calcareous matter than what is necessary for other grains ; that lime acts as an alterative, as well as an active medicine ; and that the defects in the constitution of the soil are cured, even after the stimulant and fertilizing effects of the lime have long ceased to operate. Lime is also peculiarly beneficial in improving moorish soils by making them produce good herbage where nothing but heath and unpalatable grasses grew formerly, of which instances, too numerous to be repeated, must be in the recollection of every experienced farmer. The expenses of this article, and the distance to which it is carried, in some parts of Scotland, is stated to be enormous ; in Aberdeenshire, for instance, very little of it is produced in that country ; it is carried inland to the distance of more than thirty miles, after being imported from Sunderland ; yet lime is there considered to be so absolutely necessary to the land as to be considered the foundation of all substantial improvement. It is supposed, however, not to be so useful on the sea-shore as in the inland districts, from the soil being perhaps mixed with sea-hills.

Lime is certainly well calculated for *clay lands.* Some recommend laying on a certain quantity of it, to the amount of 20 bolls of "shells" *(calcined lime)*, or 120 bushels, to the Scotch acre, or 96 to the English acre, and as hot as possible, every time the land is fallowed. This plan is, however, objected to from respectable authority, and it is contended that so small a quantity of lime shells is quite unfit for stimulating any kind of soil, except where it is of a dry muirish nature, and not formerly limed. To lime land every time it is in fallow seems unnecessary ; more especially if a sufficient quantity were applied in the first instance. From 60 to 70 barley bolls per Scotch acre, or from 360 to 420 bushels per Scotch, that is, from 288 to 336 bushels per English acre, are quantities frequently given in East Lothian. In regard to loams, if they are in good condition, and in good heart, perhaps liming once in two rotations of —— years each will be sufficient. It is a rule, however, in regard to the application of lime, *that it should only be applied to land in a dry state, and well drained.*

It is evident that strong, deep lands require a greater quantity than those which are shallow. One eminent farmer is of opinion that it should be applied frequently, and in small quantities at a time, especially on gravelly-bottomed loams, which are apt to become too open and pliable by an over-dose of lime ; by following which practice he finds his crops wonderfully improved, both in regard to quantity and quality. Another states, "that he has never seen lime used in too great a quantity, if the land be judiciously cropped ; if otherwise, it will ultimately hurt the soil. He has laid on no less a quantity than 100 bolls of shells, four Winchester bushels each, per English acre, and frequently with much success—though on dry fresh land a less quantity will do." Dr. Coventry is of opinion that in general six tons of unslaked, or nearly burnt, lime of ninety or ninety-five per cent. of purity, may be sufficient for the statute acre of land that has never been limed ; but if the lime be impure, a greater proportion will be requisite. Several intelligent farmers are, however, of opinion that not less than 60 or 70 bolls of lime shells per Scotch acre, or 280 to 340 bushels per acre in England, should be laid on a strong clay soil ; and that this quantity, with judicious cropping, will be sufficient for 19 or 21 years.

The information transmitted by another person who has limed more land than any individual in the whole island, and in the course of thirty years has tried various experiments in regard to the quantity that should be supplied per acre, is of peculiar importance. On newly broken-up land from old turf, he has laid on from 20 and 25 to 40 and 45 bolls of shells, of 4 bushels each, per English acre.

On light and thin out-field soil the crop in that part of the field that was limed at the rate of 20 and 25 bolls per acre, was as rough, and appeared equally good, with the crop on the land that had received 40 bolls per acre; but when it came to be threshed out, the grain was found very inferior in quantity, and still more in quality. Upon clay-soils the effects of the lime where a small quantity was laid were hardly discernable, while that part of the field that received 40 to 45 bolls produced an abundant crop. Finding the produce of the land that was limed with a small quantity so very inferior, he laid on, when the land came to be re-fallowed, 20 to 25 bolls more, the effect of which was never perceptible. He is therefore of opinion that every kind of soil should have a good dose at once, in which case he considers no repetition to be necessary for a long time afterwards; but, if repeated at all, the second liming should be considerably greater than the first, which seems to be the general opinion of the Scotch farmers.

As to the repeated liming in small quantities, this person is convinced that whatever is laid on in that way, after the first dose, is so much money thrown away. He can give no stronger proof of his conviction in that respect than his practice upon a particular farm. He entered upon it in June, 1808, and since that time he has gone over about 850 acres, and though a great part of it consists of light dry soil, and the lime has to be carried twenty-four or five miles, consequently at a great expense, yet on no part of his farm has he laid on less than 40 bolls, or 240 bushels per English acre, and on many places fully 50 bolls. Nothing, in his opinion, assimilates the produce of out-field to in-field land so much as a good dose of lime laid on at once. The consequence of this liming has been the most productive crops to be seen in all that neighborhood.

Applying lime to green crops is attended with more difficulty. From observation and practice it is recommended that lime should be laid on so early in the spring as to admit two, if not three ploughs, and as many harrowings after the lime is laid on, so as both to mix it properly with the soil, and also to let it have time to cool in the land, otherwise it will be very apt to cause the loss of the turnip crop.

A farmer, who has long paid peculiar and successful attention to the management of lime, adopts the following plan in applying it to his turnip land. After the ground intended for turnips has had a winter and spring furrow, the lime is laid on and well harrowed in; it then gets another furrow before making up the drills, and is again well harrowed, for the double purpose of mixing the lime intimately with the soil, and taking out any quickens *(couch)* or other weeds by which the field is infested. The turnips are sown in drills, both as being better for the turnip crop than when sown broad-cast, and the land is better cleaned either from annual or perennial weeds.

It is reckoned an advantage to have the lime got forward during the former summer, previous to its being laid on for turnips, for in a turnip farm there is so much spring labor that it is hardly possible to drive any considerable quantity of lime from any distance at that season of the year. When it is new from the kiln, it is so hot that it is apt to dry up the moisture necessary for bringing the turnips into leaf; in this case, the lime ought to be laid on a piece of very dry ground in large heaps, and thrown up to a considerable thickness, which will make it in a fine state for laying on in the spring, that is neither in a wet nor very hot state.

The *application of lime to grass*, particularly on light or dry soils, and when the land has been long pastured, is a most advantageous system, if it is soon after to be brought into culture; otherwise, being exposed to the atmosphere with but little admixture with the soil, it cakes and hardens, and in some measure resumes that unproductive quality which it possessed previous to its being reduced to a caustic state. It may be applied after the land has been a summer in pasture or cut for hay; but the ground should be made as bare as possible, otherwise it will be difficult to spread it equally over the sward or surface. The lime should be laid on in the autumn, and the land should remain in grass another season until it is absorbed. If intended to be applied to old ley, either lay the lime on one year before cropping, letting it lie upon the surface, or lay it on about Martinmas, and let it remain on the surface till February, and sow the ground when the weather is suitable. Suffering ground to remain for some years in grass is certainly the best preparation for lime; as it has then fresh mould and vegetable matter to act upon.

Though liming the surface "to extirpate heath and improve pasturage" may not be a profitable concern on all swards, it is proper to observe that when land is broken up merely for the sake of improving the pasturage, the best and most economical mode is to apply lime to the surface, and to harrow it along with the grass seeds, and a great extent of hilly pasture has been improved by this means.

It is an ascertained fact, that lime is of no advantage in the neighborhood of Edinburgh, where the land has been long accustomed to aration and city manure. The reason probably is this, that the land having been so often limed with street dung, which frequently contains a proportion of shells, the use of stone lime is thereby superseded. Indeed some are of opinion that the land in the immediate vicinity of Edinburgh had been abundantly limed at some former period, which, in addition to the calcareous matter mixed with the street dung, renders any additional liming unavailing.*

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* The soil around Edinburgh is basaltic, and as basalt always contains lime, it is much more probable that it is owing to this circumstance that lime produces no effect when artificially applied. On such soils, lime can produce an effect only when applied to fresh broken-up land, containing a redundance of vegetable matter, and in this case the benefit must, for an obvious reason, be but temporary.

These lengthened extracts upon the application of lime, though somewhat conflicting in particulars, are calculated to throw much light upon a branch of agriculture of the highest importance, which is yet involved in considerable mystery. Almost the whole of Scotland consists of primitive rocks, and the soils which result from their disintegration, except in the case of trap or basaltic rocks, contain little or no carbonate of lime. Now the latter substance being an essential ingredient in all fertile soils, the large quantity of lime applied by the Scotch farmer cannot fail to produce a highly favorable change in the composition of the soil, and enable it to support plants which previously would not grow upon it. Nor is it lime alone, as a constituent of the soil, which produces the favorable change, for, according to Sprengel, all limestone contains a considerable quantity of potash, which is no less essential to the growth of both corn and grass crops, and it is highly probable that the longer or shorter continuance of the effect of the lime principally depends upon the greater or less quantity of potash contained in the lime applied. The first and most striking *action of caustic, or fresh lime*, is in breaking down the rough inert vegetable matter contained in the soil, and fitting it for the food of plants ; which accounts for its having a greater effect when applied to land recently broken up, and which abounds in such vegetable matter, than upon lands which have been under constant tillage. It is likewise a powerful agent in the disintegration of clay soils ; as it, by that means, liberates the potash contained in them, in addition to that which itself conveys. The observed superior effect of a large dose, given at once, to smaller but repeated applications, admits of explanation by the known fact, that *quantity* is a very influential condition in chemical action ; and that a large mass will have a greater effect than two smaller ones, though of equal united amount, but applied separately.

Another effect of lime is, that it decomposes the salts of iron, which are sometimes found in soils, and are very injurious to vegetation; it also promotes the decomposition of the excrements of plants, and thereby enables land to bear a quicker succession of the same crops than could otherwise be produced.

When the chemical action of lime is exhausted, and it has returned to its original condition of mild lime, or carbonate of lime, it is still a source of nourishment to plants, and is taken up as a part of their food, while that which is not so appropriated serves as a valuable mechanical constituent of the soil—rendering clays more open, and lands more absorbent and retentive of moisture.

With regard to the *application of lime to pasture land*, we have seen it produce the most astonishing effect upon old pastures incumbent on mountain limestone, and old red sandstone. On the Mendip hills in Somersetshire, the pasture becomes loaded with thick dead grass, of a brown wiry appearance, and in this state affords a very inferior herbage, almost destitute of white clover; when in this condition, the application of a heavy dressing of lime, either quite fresh from the kiln, or after being made into a compost with earth, totally changes its aspect, and thick heavy crops succeed, in which the white clover predominates. The quick-lime is often thrown over the land without being previously slaked, and repeatedly bush-harrowed as soon as it becomes sufficiently broken. The effect of a full dressing extends over a great many years, and renders repetition needless. In this respect it resembles a heavy dressing of marl, but acts with greater energy at first, and produces a more striking effect, by its chemical action as quick-lime, both upon the dead vegetable matter, and alson upon the soil, in the manner before noticed.

It is rather doubtful whether this mode of applying lime to such grass land, or that of making it into a compost, be most preferable, but as no decided difference of effect has been observed, economy of labor would be in favor of the former. It is fair to conclude that the more caustic the lime is, when first laid on, the more energetic would be its action, and the greater its immediate effect, but the more lasting benefit would be much the same in either case.

Upon all *peaty soils*, whether in marshes or uplands, with previous *complete drainage*, lime proves an excellent manure, and its beneficial effect upon such soils admits of the most satisfactory explanation from the description already given of its nature and mode of action. Besides the ordinary constitution of peat, which consists for the most part of inert vegetable matter, that, from causes beautifully explained by Liebig, has ceased to undergo further voluntary decomposition, it often contains sulphate of iron, and those peats of upland districts, resulting from the decay of heaths, free phosphoric and sulphuric acids, all substances exceedingly injurious to vegetation, but nevertheless capable of being neutralized, and even converted into the food of plants by the action of lime, that is, into phosphate and sulphate of lime.

This explanation of part of the observed effect of lime upon such soils rests upon the authority of Sir Humphrey Davy, who had the distinguished honor of being the first to bring chemical science to the aid of agriculture.

It is well known by practical agriculturists that the application of lime is capable of abuse, when applied without a fair and sustaining succession of green crops. Unless followed by a fair and legitimate course of cropping, lime becomes what the farmers call appropriately in the midland counties a scourging manure to the land, by which its powers of producing corn crops may be almost entirely exhausted. This, however, cannot be urged as an objection to its legitimate use, any more than the successive cropping with corn, of land that has been pared and burnt, when the stiffness of the soil and the redundance of vegetable matter render that operation desirable, and highly beneficial at the commencement.

Liming, like paring and burning, unlocks the treasures of the soil, and gives the farmer the command of them, which he may certainly abuse if he is unrestrained either by integrity or an extended interest in the soil, and a prescribed course of cropping. When, however, land is let on long leases, as it always should be, and proper covenants for cropping are entered into, liming in most countries is the foundation of good and profitable husbandry.

The application of lime appears to be controlled by the geological structure of the country. An irregular line drawn from the south side of the mouth of the river Tees to Bridport in Dorsetshire will separate the kingdom into two unequal portions of very remarkable geological difference. That on the east consists, 1st, of a succession of rocks of imperfect limestone, with intervening strata of clay, and is called the volitic series; to these succeed the iron-sand, with its accompanying dark clay, the green sand, the chalk, the plastic and London clays, and the Bagseot sands and gravels. To the west of the above line, which is defined by the Lias limestone and clays, we have that extensive tract, the new red sandstone; the coal-measures and mountain limestome partially distributed; the old red sandstone; the series of transition rocks of Wales, chiefly slate; the transition and primitive rocks of Devon and Cornwall, and of the extreme north-west of England. Throughout the latter division, the use of lime is almost universal, and is considered indispensable to the fertility of the land. But to the east of the line described, comprising the whole of the south-east part of England, lime is more sparingly applied, and over extensive districts it is not used at all.

To go further into this subject, however strongly we may be tempted to dilate upon it, would be inconsistent with the object of the present treatise. Geology, however, is one of the most interesting subjects that can occupy the attention of the landed proprietor, and the enlightened agriculturist, as it enables him to understand the nature and causes of the general distribution of soils; the leading characteristics and peculiar qualities of each; the influence they exercise in the natural distribution of plants; the most judicious modes of draining upon a large scale; and the resources they present both for their chemical and mechanical improvement. It often happens that very stiff clays are found in the immediate vicinity of poor, light lands; in such cases, each will benefit the other by mere mechanical mixture, by rendering in one case the soil more open for the admission of air to the roots of plants grown upon it, and in the other more retentive both of water and manure. A comprehensive view of manure, or the food of plants, will include both water and air; and unless both of these are allowed to penetrate and pervade the soil, all others would be of none effect. When water too much predominates, as is often the case in very retentive soils in wet seasons, the plants in such a soil languish from two causes, the low temperature of the land produced by evaporation from the surface, and the exclusion of the air. When, on the other hand, soils are so loose as to be too permeable to the air, and at the same time not sufficiently retentive of moisture, as will be the case in dry seasons, there will then be a deficiency of water to nourish the plants, and much of the volatile matter of the manure will escape into the air in a gaseous form. Such soils as the latter are properly called hungry, because they are incapable of sufficiently retaining the manure which is put into them. It must be evident, that the productiveness of soils of such extreme and opposite characters must be very much influenced by the quantity of rain which annually falls in their localities. A sandy soil, which in the west of England would be tolerably fertile, would in the east be almost barren; and conversely, a clay, which in the west would be too wet to yield good crops, would in the east be productive. The greatest improvement that can be effected on such soils, and which should precede every other, is thorough draining and subsoil ploughing of the stiff soil, and mixing in both.

CHAPTER XI.

Artificial Manures.

Though this work has been chiefly devoted to the preservation and management of Farm-yard Manure, and the application of those mineral substances which are most commonly applied, and generally obtainable in almost every district, as the title implied it would be, we have, however, thought it indispensable to notice, at considerable length, those substances which are generally used as substitutes, because it is certain that land cannot be maintained in the highest state of productiveness without the use of such manures; in other words, without restoring those substances which are continually drained from it in the shape of various saleable produce. The more bulky of these may be left out of the account, as they are abundantly supplied by the hand of nature in the growth of green crops; and the quantity removed in the shape of corn, cattle, sheep, and wool, is unimportant. It is not owing to a deficiency of these that soils become unproductive, but from the want of substances which, till lately, have not even been considered as having any thing to do with the nourishment of plants, much less as indispensable to their existence.

The first of these is nitrogen, in the form of ammonia, and the remainder constitute the ashes of plants and seeds when burnt, and consist of alkaline and earthy salts; in other words, of potash, soda, lime, and magnesia, forming salts with carbonic, sulphuric, muriatic, phosphoric, and silicic acid (flint.)

If the *entire produce of a farm were to be carried away from it*, and no manure returned to it, the land would, in the great majority of instances, speedily become incapable of bearing crops; or, in the common phrase of farmers, it would be "worn out," owing to the deficiency of some or all of the above substances. If, on the other hand, the *whole of the produce were consumed upon the land*, it would continue to increase in productiveness, until more could not be grown for want of space. This decrease in the former case, and increase in the latter, would be accelerated or retarded by the original nature of the soil, and the maximum quantity would of course be influenced by the same cause.

These extreme cases are not merely hypothetical; they may be seen in actual operation in many newly-peopled countries, and particularly in North America. The forests in that country, which had been growing for many centuries, when cut down and burnt by the settlers, left the land so rich as to be considered inexhaustible; most of the produce was carried away, and the dung left was regarded as an incumbrance. By the repeated cultivation of exhausting crops, however—wheat and tobacco, for instance—much of that land in the maritime States, which have been the longest settled, is now reduced to a state of poverty, and requires heavy dressings of manure. Although we mention these as extreme cases, yet the consideration of them is useful, as exhibiting a broad indication of the means by which poor land may become fertile, or very rich land reduced to beggary.

The medium case is that of land, in older countries, under a regular course of cultivation, and where corn and green crops succeed each other in due order and proportion, and from whence nothing is carried away but corn, cattle, sheep, and wool; which is the case of the majority of corn farms in this country. Land, under these circumstances, is the proper subject for our more particular consideration.

If a farm, under such a course of husbandry as that mentioned above, and generally approved as a good and lasting system, be cultivated for a series of years without being supplied with *any manure from foreign sources*, the land must lose, in a course of years, a considerable portion of those inorganic or mineral substances which we have stated above to be indispensable to the growth of plants, and which is yearly withdrawn, as we have already stated, in the shape of corn, cattle, sheep, or wool, and the time will necessarily arrive when the crops will become deficient. This will ultimately take place in almost all soils, though upon certain rich spots it may not be perceptible for many years; and, on many it will of course be felt much sooner than on the generality.

This deficiency will be found to affect different crops in particular soils. In one the clover crop will become deficient, in another the turnip crop, in a third the wheat or the pulse crop, according to the deficiency of one or more of those substances which are required by the particular species grown. These partial defects in soils will be influenced by their original constitution, by accidental or artificial causes, and by the particular crops they have sustained. The seeming capriciousness of the effect of particular salts, when applied as manures, can be explained only upon this principle. With such a view of the subject we may readily understand why a particular salt which has produced a great effect upon one soil, affords but little benefit upon a second, and utterly fails in a third. It will produce a *great effect*, when that particular salt *happens* to be deficient in the soil, and all the other substances required by the plants exist in it in sufficient quantity. It will produce a *moderate* effect, when the deficiency of that salt is not considerable, or when some other salt or salts are deficient. It will produce *no effect at all*, when it is already abundant in the soil, or when some other substance, equally required by the plants, is very deficient, or altogether absent.

It is well known, that land which has "grown sick," as it is called, of clover, will often bear plentiful crops upon being dressed with a seemingly insignificant quantity of gypsum; and when that substance fails, the addition of wood, or even peat-ashes, will produce the desired effect. In the first case gypsum only was wanted, in the second both that and potash were deficient. Substances containing much ammonia will generally improve the quality and quantity of wheat; but if phosphates are wanting at the same time in the soil, the ear will still be defective; and if potash, the straw will be weak, and more liable to fall early, and to *suffer blight*. From the foregoing considerations, and what we have previously said upon this important subject, it must be evident that it is trifling with land, and calculated to produce frequent disappointment and loss, to apply any one salt as a substitute for manure. When the perfect manures (perfect, because they contain all the substances which plants require), such as farmyard dung, preparations of night-soil, guano, or the dung of other fowls, cannot be obtained, recourse must be had to artificial mixtures. Now the substances the most likely to be exhausted from soils, from the causes above mentioned, are *ammonia*, *phosphate of lime and magnesia*, *potash* and *gypsum*.

The *efficiency* of these, were they applied separately, would generally be found to rank in the order in which they are placed, but it would be unsafe to omit either of them, and in remote inland situations common salt also should be included. A compound of such substances could scarcely ever fail to produce the most fertilizing effect, both upon corn and green crops. They have individually been found to produce such an effect, and they have each also individually failed, but such manures as have included them all have perhaps never been found to disappoint the expectation of the farmer; the reason of which we have before stated. The *quantity* of the *pure salts* above named, requisite to keep land in high condition, which is under a regular course of cultivation with green and corn crops, is very small; and perhaps four bushels, of which the two first constituted the greater part, or mixtures which contain that quantity, would suffice to supply upon an acre of land the waste or abstraction of such substances during five years.

The most generally available sources of these salts are, soot, bonedust, and kelp-ashes (the better if only charred), or the two former with wood or peat-ashes, gypsum or sea salt. If peat-ashes are used, gypsum may be dispensed with.

The quantity above given it is to be understood has reference to the *pure salts*, independent of the *crude* and *useless matters* with which they are generally, and it may be said necessarily, mixed;

and applies to land which is supplied in due course with ordinary farm-yard or fold manure. Bone-dust has, in many instances, been lavishly used, and in much greater quantity than the phosphates, of which it chiefly consists, are consumed. This substance has been used in some localities until it has ceased to produce any effect, even with the aid of the nitrogen, of which all bones contain a greater or less quantity, unless they are calcined; in fact it has been unreflectingly applied until other substances equally needful to plants have become exhausted; it has indeed been found that horn-shavings, which are considered one of the most powerful of manures, have been applied until they ceased to produce any effect, and from the same cause.

By the application of such partial substances for manure, we do not fulfil all the conditions of fertility, and disappointment consequently ensues. The silent expression of nature has not been rightly understood, because her interpreter—the chemist—has not been consulted, or has been treated with contempt—as a mere "book-learned theorist"—when he has offered his services to explain her meaning.

Though nature provides us with ammonia, as well as carbon, through the medium of green crops, yet to maintain *a high degree of fertility* in corn crops, and especially in the production of wheat, ammonia must be considered as one of the most important ingredients of an efficient composite manure; and in order to form a manure of unfailing efficacy upon every kind of land, substances containing salts of ammonia must be added to those inorganic or mineral substances that constitute the ashes of the plants and seeds which the land is required to produce. None of these must be omitted except such as we are quite certain already exist in the soil in exhaustible quantity. There can seldom be any want of silica, and more seldom of oxide of iron. Muriate of soda (common salt) and sulphate of lime (gypsum) are the next substances which are less likely to be deficient in the soil; but very few under constant cultivation contain enough ammonia, phosphates, and potash, and consequently upon which a mixture of soot, wood-ashes, and bone-dust, or rape-dust, would produce a most powerful effect.

We trust that the above observations, together with what has been previously said, will go far to explain the apparently mysterious nature of manures of this kind, and throw light upon a subject which has so long been involved in doubt and uncertainty, and the want of which has occasioned much perplexity, as well as frequent disappointment and heavy losses.

The best mode of applying manures of this kind is, certainly, by mixing them with coal or peat-ashes, and delivering them to the soil in drills at the same time with the seed—the method now most generally adopted.

CHAPTER XII.

Rotation of Crops.—Drainage.

The Rotation of Crops is necessarily connected with the subject of manures, and a consideration of the food of plants explains the nature of the advantage which is derived from a varied succession. Green crops replenish the soil with *organic elements*, which they derive from the atmosphere, and some of them—such as sainfoin and lucerne—with *inorganic matter*, which their deep roots extract from the substratum; these they return again to the soil, either in the state of the dung of animals which have fed upon them, or as humus, resulting from the decay of their roots, which entitles them to be called *fertilizing crops*. Unripe weeds of every description, and green crops, if ploughed into the ground, have a powerful effect not only on the succeeding crop, but if repeated, during every regular rotation, will be found to materially enrich the staple of poor land. Farmers do indeed sometimes plough in a crop of buckwheat, as a species of summer-fallow, and it is a good preparation for a crop of wheat; but the temptation of feeding it off, or cutting it for fodder, more frequently induces them to rob the land of it.

The corn, or *exhausting crops*, abstract from the soil both the organic and inorganic substances, much of which, and particularly nitrogen, and the inorganic, or mineral, constituents, are annually carried off by cattle, sheep, and the production of grain; and hence the appellation they have received. These substances, are, however, drawn from the soil in very different proportions by different crops; one, as potatoes, requiring more humus; another, as wheat, more phosphates, and nitrogen; and a third, as oats, more silicate of potash; while beans, peas, and vetches require little or no phosphates, and bring a large contribution of carbonic matter in their straw, and nitrogen in their leaves.

In this way one kind of plant finds in the soil enough of its appropriate food which the preceding plant did not require, and leaves that which its successor wants. Thus, by a suitable and judicious rotation, each exhausting crop receives in its turn due support, while, by the supply of manures, and the timely interchange of green crops, all the substances are restored to the soil, which would otherwise be exhausted.

There is, however, another cause for the necessity of a change of crops besides the exhaustion of the proper food of plants; for it has been found, that however plentifully manure may be supplied, land will not sustain an unvarying succession of the same crops. It has been discovered by recent experiments that plants discharge an *excrement* from their roots, when placed in water, and that a second of the same kind, placed in the same water, sickens; but if this plant be replaced by a third of a different kind, no such consequence results. This *excrement*, therefore, operates as a ***poison*** to those plants from which it has been produced, and an accumulation of it in the soil, by a repetition of the same crop, must necessarily prove injurious. Time, therefore, is required for the decomposition of this peculiar excrement, before the land will bear a repetition of that crop. This change takes place much sooner in light and open than in adhesive and heavy soils, and it is accelerated by the operation of fallowing, and the action of lime and alkalis. This is one object answered by repeated dressings of lime in particular localities where the wheat crop is too often repeated.

We will here suggest another cause of the advantage of change. Each plant is observed to have its peculiar tribe of predatory insects, which would accumulate in a succession of the same crops, but are periodically checked or destroyed by a succession.

In conclusion it should be observed, that every attention which can be paid to the preparation and application of manures will be ineffectual in rendering soils fertile, unless due regard be given to the removal of excess of moisture by *draining when needful.* When a soil is saturated with water, the air is excluded from the roots of the plants, and prevented from acting upon the manure; while the low temperature produced by continual evaporation from the surface, has an additional powerful effect in retarding the progress of vegetation.

To lay manure upon wet soils is, in truth, *to throw money away;* but were draining universally effected, the whole of the now comparatively unproductive soil of the country would, to a vast extent, be rendered capable of receiving the benefit of the numerous modes of fertitizing it. Its returns are immediate, as well as compensative; and to hesitate to drain the land, is to hesitate to confer a benefit upon one's self, of which a strong proof has been lately brought forward in a statement of the profit resulting from the drainage of 467 acres, and the employment of the drain water over 89 acres of land, on the estate of Lord Hatherton, in Staffordshire—*affording a clear annual interest on the outlay of full thirty-seven per cent.!*

☞ We here conclude Mr. Falkner's treatise—having omitted such portions of it as could be done, without at all affecting its completeness and value to the American farmer. We end this section by adding two extracts, of domestic origin, on the subject of Draining.

The farmer having determined upon the best mode of laying out his farm into fields, will next turn his attention to the means of making them useful. The draining of wet lands, is oftentimes one of those means. Success in the practice of draining, will, in a great degree, depend upon the knowledge of the various strata of which the upper crust of the earth is composed, and the porosity of those strata, or their capacity of admitting and rejecting the passage of water through them; and also the modes in which water is formed, and conducted from the high to the low grounds. Some of the strata of the earth admit the passage of water through them, others do not allow it any passage, but force it to run along their surfaces. If obstructions interpose themselves to its free passage, the water is forced up through the superabundant strata, if they are porous, rendering them frequently too wet for tillage. No good system of drainage can be adopted without a knowledge in regard to these matters, as well as the distribution and depth of materials constituting the soils. The wetness of lands depends either on the water which is formed or collected on the hills or high ground, filtrating down among some of the different beds of porous materials, that lie upon the impervious strata, forming springs below and flowing over the surface, or stagnating underneath it; or from rain or other water becoming stagnant on the surface, from the retentive nature of the soil on which it falls. "The particular wetness which shows itself in different situations, in the forms of bogs, swamps, and morasses, for the most part proceeds from the first of these causes; but that superficial wetness which takes place in the stiff, tenacious, clayey soils, with little inclination of surface, generally originates from the latter. The most certan and expeditious method of draining in such cases, is that of intercepting the descent of the water or spring, and thereby totally removing the cause of wetness. This may be done when the depth of the superficial strata, and consequently of the spring, is not great; by making horizontal drains of considerable length across the declivities of the hills, about where the low grounds of the valleys begin to form, and connecting these with others made for the purpose of conveying the water thus collected into brooks or runlets that may be near. When the spring has naturally formed itself an outlet, it may frequently only be necessary to bore into it, or render it larger, and of more depth; which, by affording the water a more free and open passage, may evacuate and bring it off more quickly, or sink it to a level so greatly below that of the soil as to prevent it from flowing into or over it. When water is found upon thin layers of clay, having under them sand or other porous strata of some depth, by perforating the thin layers of clay in different places, the water will escape through the porous materials below, and the surface of the ground become perfectly drained. The superficial wetness of lands, of which we have spoken, arising from the retentive character of the materials composing the soils, and the circumstances of their location, may, in most cases, be removed by means of hollow drains formed either by the spade or plough. In forming drains where there is a declivity in the ground, care should be taken to make them in a slanting direction across it, instead of the most usual method of laying them according to the inclination of the slope. The depth of these drains will depend upon the nature of the soils, the position of the land, and many other circumstances. When the materials of the soil are porous, the deeper the drains are cut, the more extensively they act in diminishing the wetness of the land. It is of importance to cut the drains as narrow as possible. The best period for making drains is the spring or beginning of summer, because the land-springs are then more easily discovered or traced, than at a later season.—*Hooper.*

TO THE PRESIDENT AND STANDING COMMITTEE OF THE RHODE ISLAND SOCIETY FOR THE ENCOURAGEMENT OF DOMESTIC INDUSTRY:

Gentlemen—In the remarks which follow, I have attempted to give the results of my experience in reclaiming peat swamps, in which I have been very successful.

Agriculture has been the principal business of my life. Being a practical farmer, I have made many experiments in the raising of vegetables and the use of manure; but I will now give my views upon the reclaiming of low land by the construction of blind ditches, in which I have had many years experience.

On my farm there were several cold, wet swamps, the income of which would not pay the expenses of hauling the cattle out of the mire in the spring, when they are so anxious to get the green grass that grows in the mud holes. To prevent my cattle from getting mired, I caused ditches to be dug through the swamp and left open. This did not, however, prevent the cattle getting mired, nor improve the quality of the grass, except for a few feet from the ditches. I endeavored to keep the ditches open, but they only answered the purpose of carrying off the rain water, and left all the cold spring water, that I desired to get rid of. Where subterranean ditches have been properly made and covered, there has not been the least difficulty in ridding the swamps of spring water. Swamps thus drained, have never been affected by wet seasons; in fact, some of my swamps, which were once beds of mire in the spring of the year, may now be plowed and planted as early as any other land.

I commenced my experiments in 1830. I had a cold wet swamp, containing about one acre of land, lying before my house, which yielded a heavy burthen of coarse swamp grass, intermixed with rushes, skunk cabbage, and other noxious weeds. This crop was only fit for bedding cattle. In the spring of the year, the swamp was a bed of mire: for many years I had one ditch through it, and frequently two or three, but they neither drained the swamp, nor improved the grass. Previous to underdraining, I had frequently carted sand and gravel on to the swamp, which was dish form, lowest in the centre, but with very little effect.

The swamp being near my house, was quite offensive, and believed to be unhealthy: it therefore became important that it should be reclaimed. By sounding, I found that the mud was deepest in the centre; I then caused a main ditch 2½ feet wide, to be dug through the centre of the swamp, and deep enough to take the upper water-courses. Small ditches were then dug from the spring holes to the main ditch. The ditches were then all filled with stones cast in promiscuously, but deep enough to be out of the reach of the plough. The stones were then levelled, and well covered with coarse hay, dry sea-weed, &c., to prevent the earth finding its way among the stones thus deposited; the earth which had been taken out of the ditch was then cast back.

After this preparation, I proceeded with one-fourth of an acre as follows: I collected a quantity of small bushes and weeds, sea weeds and other rubbish, and commenced plowing the swamp with two yoke of oxen. Having plowed one furrow, I filled it with the brush, sea-weed, &c., and turned the next furrow upon it. I proceeded thus until the entire quarter of an acre had been plowed and treated like the first furrow.

This may be by some thought to be small work, but I have made it a rule and advised others when they were to try experiments, to try small ones. If they succeeded, they could increase; if they had failed, they would lose little.

The ground thus plowed was then cut and levelled with the bog hoe and harrow, and twelve cart loads of compost manure spread on. It was then sowed down in September of that year, with six pounds of small clover, six quarts of herd-grass, and one bushel of bent seed. In the July following, 1831, I cut from this quarter of an acre, one ton of hay at a single cutting, which was sufficient, besides paying the cost of cutting and curing, to pay the entire expense of reclaiming and preparing the land on which it grew. It may be well to state that hay was that year worth $30 per ton.

The remainder of the swamp could not well be plowed and prepared at the same time. I however carted on sand and gravel to kill the foul grass that was not destroyed by the bog hoe, the same fall and in June, 1831, I put on compost manure at the rate of 50 loads to the acre, and proceeded as before with bog-hoe and harrow. I sowed oats with grass seed. The oats grew very large, were mowed in their green state and taken off. The young grass grew so large the same year, that some of it was mowed. Since that time, it has been mowed every year and the whole swamp has made an average yearly crop of three tons of hay per acre. For four years, nothing was done to the land. Since that time it has annually had a light dressing of manure. The clover run out after the first year, except over the ditches, where it still remains. The herdsgrass [Timothy is here meant,] and bent, or burden, were the principal grasses; the herdsgrass growing to a monstrous size, producing some heads measuring 13 inches in length. Every three years this acre of land pays the entire expense which has been laid out on it, besides the cost of culture, manure, &c.

In 1835, I partially reclaimed and cultivated a second swamp, to great advantage. In this swamp, the mud was found to be deepest under the banks, which is generally the case where the banks are high. Here the ditches are made on the margin of the swamp; but in all cases there must be fall enough to carry off the cold spring water. In digging ditches, they should be dug deep enough to take the first water-course; these are generally found at the pan or subsoil. To be certain and to make the labor effectual, it is well to dig from 4 to 6 inches into the pan, to give the spring water a passage; it will then rise and run off among the stones in the ditches.

I commenced three years ago on a third swamp, where I wished to reclaim four acres. This, or a part of it, was peat; the ditches were therefore required to be cut six feet deep: on a small part of the swamp the ditches were two rods apart. It is probable that twice that distance would have answered, but having plenty of stone at hand, and wishing to make thorough work, they were placed nearer together. On this part, which was about three quarters of an acre, no animal could find a footing—hence all was done by manual labor, with spade, bog-hoe, &c. The stones were wheeled in on planks, and deposited and covered in the ditches, as in the former cases. In 1842, it was impossible for an ox to walk over this land, yet in the spring of 1843, it was plowed and planted. Manure was carted on without the least inconvenience. On the last of May, three acres were planted with potatoes, and a fine crop was obtained. Among these were planted for experiment, corn, pumpkins, cucumbers, squashes, turnips, &c., all of which grew vigorously and ripened.

On the 21st and 22d of June, 1844, two acres of this reclaimed land was sown with millet and grass seed—12 quarts of millet and one bushel of herdsgrass with other grass seed to the acre. On the 1st of September the crop was harvested. The millet had grown to an enormous size, the top heads as it stood measuring six feet in height; it was judged by the reapers, and by those who saw the field, that from 8 to 10 tons of fodder would be produced on two acres. Thirty bushels of seed were obtained from the top heads. The remainder of the reclaimed land was planted principally with potatoes, more than half of which were rotten, though not more so than those raised on other land on my farm, and by my neighbors.

The expense of reclaiming and manuring will not be far from one hundred dollars per acre.

I have long been of the opinion that swamps are our most valuable lands. The outlay necessary for reclaiming them, prevents their culture; but my experience has proved to my satisfaction that where there is fall enough to drain a swamp, they will produce more clear profit than any other lands I have ever cultivated, even allowing the expense of under-draining, manure and clutivation to be $100 per acre. Before under-draining, these lands are worth but a trifle. I have sold from one acre of reclaimed swamp, three tons of hay at $20 per ton, from a single mowing.

I would remark, that casting the stones into the ditches promiscuously is much the best, for it permits the water to enter without any obstruction, and to find its way through them, and it will keep itself in good order; if I could have a stone box put in at the same expense, I should prefer to have the stones cast in promiscously. After one of these ditches had been made twelve years, I opened it for the purpose of changing its course. The stones were perfectly clean and not in the least obstructed by mud.

It should be recollected that these are blind ditches, and that they should be closed at the fountain or head, and no natural stream should be permtted to run into them.

The subscriber would invite the committee to view the bog meadows or swamps which he has reclaimed within the last fourteen years, and of which he has above given the processes pursued by him. Respectfully, yours,

Norwick, Nov. 6, 1844. GIDEON SPENCER.

CONTENTS.

FARMERS MANUAL.—By J. Falkner, Esq. . . . . . . PAGE 113

PART I.

ANIMAL AND VEGETABLE MANURE.

CHAPTER I.—General Composition of Farm-yard Dung, ... 115

CHAPTER II.—Combustion and Decay of Plants—Consequences of the excessive Fermentation and negligent Management of Farm-yard Dung—Causes of Sterility—Means of increasing the Quantity of Manure, ... 117

CHAPTER III.—Excrements of Horses—Horned Cattle, Pigs, and Fowls, 121

CHAPTER IV.—Dung and Urine of Sheep, ... 124

CHAPTER V.—Analysis and power of Human Ordure—Chinese Management—Bones, ... 129

PART II.

MINERAL AND ARTIFICIAL MANURES.

CHAPTER I.—Gypsum, Sulphate of Lime, or Plaster of Paris, . . 133

CHAPTER II.—Wood-ashes—Soot—Peat-ashes—Lime—Marl, . . 137

PART III.

ON THE MANAGEMENT AND APPLICATION OF MANURES.

CHAPTER I.—Knowledge of Farming—Soiling—Improvement of the Land upon scientific principles, ... 143

CHAPTER II.—Management of Manure, ... 146

CHAPTER III.—Improvement of Manure, ... 150

CHAPTER IV.—Liquid Manures, ... 153

CHAPTER V.—Quantity of Farm-yard Manure produced by Crops—Composts, ... 157

CHAPTER VI.—Materials and effects of Composts, ... 160

CHAPTER VII.—Application of Manures to the soil, ... 162

CHAPTER VIII.—On Farm-yards and Dung-heaps, ... 166

CHAPTER IX.—Drill System, ... 168

CHAPTER X.—Effects of Lime, ... 170

CHAPTER XI.—Artificial Manures, ... 178

CHAPTER XII.—Rotation of Crops—Drainage, ... 182

ON FARM MANAGEMENT.

PRIZE ESSAY—BY J. J. THOMAS,

WHICH OBTAINED THE PREMIUM FROM THE NEW YORK STATE AGRICULTURAL SOCIETY.

The great importance of performing in the best manner, the different operations of agriculture, is obvious to every intelligent mind, for on this depends the success of farming. But a good performance of single operations merely, does not constitute the best farmer. The perfection of the art, consists not only in doing every thing well, individually, but in a proper adjustment and systematic arrangement of all the parts, so that they shall be done, not only in the best manner and at the right time, but with the most effective and economical expenditure of labor and money. Every thing must move on with clock-work regularity, without interference, even at the most busy seasons of the year.

As this subject includes the whole routine of farming, in a collected view, as well as in its separate details, a treatise upon it might be made to fill volumes; but this being necessarily confined to a few pages, a general outline, with some remarks on its more essential parts, can only be given.

Capital.—The first requisite in all undertakings of magnitude, is to "count the cost." The man who commences a building, which to finish would cost ten thousand dollars, with a capital of only five thousand, is as certainly ruined, as many farmers are, who, without counting the cost, commence on a scale to which their limited means are wholly inadequate. One of the greatest mistakes which young farmers make in this country, in their anxious wish for large possessions, is not only in purchasing more land than they can pay for, but in the actual expenditure of all their means, without leaving any even to *begin* the great work of farming. Hence, the farm continues for a long series of years poorly provided with stock, with implements, with manure, and with the necessary labor. From this heavy drawback on the profits of his land, the farmer is kept long in debt; the burthen of which not only disheartens him, but prevents that enterprise and energy which are essential to success. This is one fruitful reason why American agriculture is in many places in so low a state. A close observer, in travelling through the country, is thus enabled often to decide from the appearances of the buildings and premises of each occupant, whether he is in or out of debt.

In England—where the enormous taxes of different kinds, imperiously compel the cultivator to farm well, or not farm at all—the indispensable necessity of a heavy capital to begin with, is fully understood. The man who merely *rents* a farm there must possess as much to stock it and commence operations, as the man who *buys* and pays for a farm of equal size in the best parts of western New York. The result is, that he is enabled to do every thing in the best manner; he is not compelled to bring his goods prematurely to market, to supply his pressing wants; and by having ready money always at command, he can perform every operation at the very best season for product and economy, and make purchases, when necessary, at the most advantageous rate. The English farmer is thus able to pay an amount of tax, often more than the whole product of farms of equal extent in this country.

The importance of possessing the means of doing every thing at exactly the right season, cannot be too highly appreciated. One or two illustrations may set this in a clearer light. Two farmers had each a crop of ruta-bagas, of an acre each. The first, by hoeing his crop early, while the weeds were only an inch high, accomplished the task with two days work, and the young plants then grew vigorously and yielded a heavy return. The second, being prevented by a deficiency of help, had to defer his hoeing one week, and then three days more, by rainy weather, making ten days in all. During this time, the weeds had sprung up six to ten inches high, so as to require, instead of two days, no less than six days to hoe them; and so much was the growth of the crop checked at this early stage, that the owner had 150 bushels less on his acre, than the farmer who took time by the forelock. Another instance occurred with an intelligent farmer of this State, who raised two fields of oats on land of similar quality. One field was sown very early and well put in, and yielded a good profit. The other was delayed twelve days, and then hurried; and although the crop was within two-thirds of the amount of the former, yet that difference was just the clear profit of the first crop; so that with the latter, the amount yielded only paid the expenses.

Admitting that the farm is already purchased and paid for, it becomes an object to know what else is needed, and at what cost, before cultivation is commenced. If the buildings and fences are what they should be, which is not often the case, little immediate outlay will be needed for them. But if not, then an estimate must be made of the intended improvements and the necessary sum allotted for them. These being all in order, the following items, requiring an expenditure of capital, will be required on a good farm of 100 acres of improved land, that being not far from the size of a large majority in this State. The estimate will of course vary considerably with circumstances, prices, &c

1. LIVE STOCK.

The amount will vary with the fertility and products of the land, its quality, and situation with regard to market. The following will approximate the average on good farms, taken at the spring of the year, or commencement of work :

3 horses, at $80,	$240	20 pigs, at $3,	60
1 yoke oxen,	75	150 sheep, at $2,	300
8 milch cows, at $15,	120	Poultry, say	5
10 steers, heifers, and calves,	70		
Total,			$870

2. IMPLEMENTS.

2 ploughs, fitted for work,	$20 00	1 pointed shovel,	1 25
1 small plow, do.	6 00	1 grain shovel or scoop shovel,	1 25
1 cultivator, best kind,	7 00	1 pick,	1 50
1 drill barrow,	5 00	1 maul and wedges,	2 50
1 roller,	10 00	2 axes,	4 00
1 harrow,	5 00	1 hammer,	0 50
1 fanning mill,	20 00	1 woodsaw,	1 50
1 straw cutter,	15 00	1 turnip-hook,	0 75
1 root slicer,	8 00	1 hay-knife,	3 00
1 farm wagon, with hay rack, &c.,	70 00	2 apple-ladders, (for gathering,)	1 50
1 ox-cart,	50 00	2 large baskets,	1 25
1 horse-cart,	45 00	2 hand baskets,	0 50
1 double farm-harness,	30 00	1 tape-line, (for laying off land,)	2 00
1 horse-cart harness,	18 00	2 sheep-shears,	2 00
1 root-steamer, or boiler,	20 00	1 grindstone,	3 00
1 shovel and one spade,	2 50	1 steelyard large, and one small,	2 00
3 steel-plate hoes.	2 25	1 stable-lantern,	0 50
2 dung-forks	2 25	1 currycomb, one brush,	0 75
3 hay forks,	3 00	1 half-bushel measure,	1 00
2 hand-rakes,	0 25	20 grain-bags,	8 00
1 revolving horse-rake,	8 00	1 ox-chain,	3 00
2 grain cradles,	8 00	1 crowbar,	2 00
2 scythes,	4 00	1 sled and fixtures,	30 00
1 wheelbarrow,	4 00		
Total,			$437 00

Other articles might be included, as subsoil plough, sowing machine, &c. A thrashing machine is not named, as it is better to employ itinerant thrashers, and save capital. To the preceding amount ought to be added one-tenth the expense of fencing the farm, as fences need renewing at least once in ten years. Every farmer should also be supplied with a small set of carpenter's tools, which would cost about twelve dollars, for repairing implements in rainy weather, and other useful purposes. This set should include saw, hammer, augers, planes, adz, mallet, chisels, square, breast-bits, &c., and by the convenience and economy afforded, would soon repay their cost.

3. SEEDS.

2½ bush. clover seed, for 10 acres,	$15 00	2 lbs. carrot seed, for ½ acre,	$ 1 00
2 " corn, " 6 "	1 00	30 bush. seed wheat, " 20 "	30 00
30 " potatoes, " 2 "	7 00	10 " oats, " 5 "	2 50
3 lbs. rutabaga seed, " 1 "	1 50	10 " barley, " 5 "	4 00
2 " field beet, " " ½ "	1 00		
Total,			$63 00

4. LABOR.

Supposing the owner to labor with his own hands, as every owner should, so far as is consistent with a general superintendence of all parts, which would probably amount to one-half the time,—he would need besides through the season two men and one boy, and in the winter one man ; during haying and harvest, he would require two additional hands. The men, boarding themselves, could be had for fifteen dollars per month in summer, and twelve in winter; if boarded, the cost of their meals would make up the deficiency in wages to the same amount.—The expenditure needed then, would be,

2 hired men 8 months 15 per month	$240 00	Day labor in harvest - - - -	32 00
1 " boy " 6 "	48 00		
Total, - - - - - - - - - - - - - - - -			$320 00

5. MAINTENANCE OF ANIMALS.

Cattle and sheep would need hay till fresh pasture, and horses hay, and also a good supply of oats till after harvest. All would be benefitted by a liberal feeding of roots, including swine. The amount of all these supplies needed, would be about

7 tons of hay - - - - - -	$42 00	400 bushels of roots, - - - -	50 00
200 bushels of oats, - - - - -	50 00		
Total, - - - - - - - - - - - - - - - -			$142 00

RECAPITULATION.

Live stock, - - - - - -	$870 00	Labor, - - - - - - -	320 00
Implements, - - - - - -	437 00	Maintenance of animals, - -	142 00
Seeds, - - - - - - -	63 00		
Total, - - - - - - - - - - - - - - - -			$1,832 00

The amount of capital needed the first year, in stocking and conducting satisfactorily the operations of one hundred acres of improved land, several items being doubtless omitted.

If this is a larger sum than the young farmer can command, let him purchase only fifty acres, and reserve the rest of the purchase money which would be needed for the 100 acres, to commence with on the smaller farm; and he will scarcely fail to make more, than on a larger, with every part subjected to an imperfect hurrying, and irregular management. He may calculate perhaps on the returns of his crops in autumn, at least to pay his hands. But he must remember that the first year of farming is attended with many expenses that do not occur afterwards; which his crops may not repay, besides supporting his family and paying his mechanic's and merchant's bills. The first year must always be regarded with uncertainty; and it is better to come out at the end, on a moderately sized farm, well tilled, and in fine order, with money in pocket, than on a large one, in debt; and hired hands, a class of men not to be disappointed and who ought not to be, waiting for their pay. There are a far greater number of farmers embarrassed and crippled by placing their estimates of expenses too low, than of those who swing clear and float freely by a full previous counting of cost.

Size of Farms.—After what has just been said, the cultivator will perceive in part the advantages of moderately sized farms for men in moderate circumstances. The great disadvantage of a superficial, skimming culture, is obvious with a moment's attention. Take the corn crop as an illustration. There are a great many farmers, to my certain knowledge, whose yearly product per acre does not exceed an average of twenty-five bushels. There are other farmers whom I also well know, who obtain *generally* not less than sixty bushels per acre, and often eighty to ninety-five. Now observe the difference in the profits of each. The first gets 250 bushels from ten acres. In doing this, he has to plough ten acres, harrow ten acres, mark out ten acres, find seed for ten acres, plant, cultivate, hoe, and cut up ten acres, besides paying the interest on ten acres, worth from three to five hundred dollars. The other farmer gets 250 bushels from four acres at the farthest; and he only ploughs, plants, cultivates, and hoes, to obtain the same amount, four acres, which from their fine tilth and freedom from grass and weeds, is much easier done even for an equal surface. The same reasoning applies throughout the farm. Be sure then, to cultivate no more than can be done in the best manner, whether it be ten, fifty or five hundred acres. A friend who owned a four hundred acre farm, told me that he made less than his next neighbor, who had only seventy-five. Let the man who applies a certain amount of labor every year to his farm, reduce its dimensions until that labor accomplishes everything in the very best manner. He will doubtless find that the amount of land will thus become much smaller than he supposed, more so than most would be willing to reduce it; but on the other hand, the nett proceeds from it will augment to a greater degree than perhaps could possibly be believed.

But let me not be misunderstood. Large farms are by no means to be objected to, provided the owner has capital enough to cultivate every part as well as some of our best small ones are cultivated.

As an example of what may be obtained from a small piece of land, the following products of fifty acres are given, and are not more than I have known repeatedly to be taken from good land by several thorough farmers:

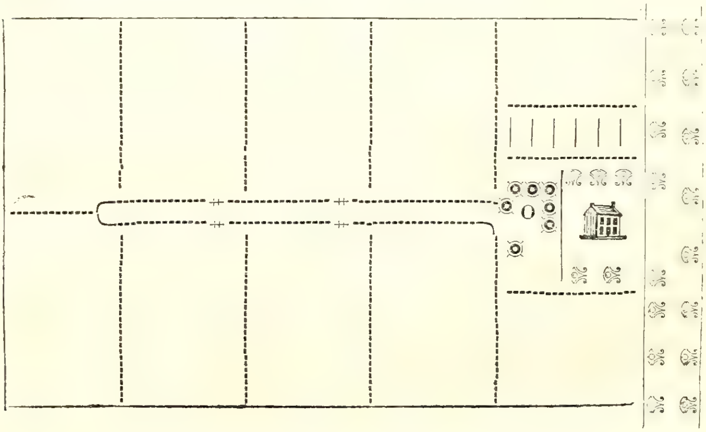
10 acres	wheat,	35 bush. per acre, at		$1.00,	$350
5 "	corn,	90 "	"	.40,	180
2 "	potatoes,	300 "	"	.20,	120
1 "	ruta-bagas,	800 "	"	.10,	80
6 "	wint. apples,	250 "	"	.25,	375
6 "	hay,	2½ tons	"	6.00,	90
10 "	pasture worth,				60
5 "	barley,	40 bush.	"	.40,	80
5 "	oats,	50 "	"	.20,	50
Total products of fifty acres of very fine land,					$1,385

This aggregate yield is not greater than that obtained by some who might be named from a similar quantity of land. Good land could be brought to that state of fertility very easily at a total cost of one hundred dollars per acre, and then it would be incomparably cheaper than many large poor farms at nothing; for while the fifty acres could be tilled for three hundred and eighty-five dollars, leaving one thousand dollars nett profits, large poor farms hardly pay the work spent upon them. One proprietor of such a farm declared—"It takes me and my hired man all summer at hard work to get enough to pay him only."

Laying out Farms.—This department is very much neglected. The proper disposition of the different fields, for the sake of economy in fencing, for convenience of access, and for a full command of pasture and protection of crops at all times, has received comparatively little attention from our agricultural writers and from farmers.

Many suppose that this business is very quickly disposed of; that a very few minutes, or hours at most, will enable a man to plan the arrangement of his fields about right. But this is a great error. Even when a farm is of the simplest form, on a flat uniform piece of ground, many things are to be borne in mind in laying it out. In the first place, we all know that the *fencing* of a moderately sized farm costs many hundred dollars. It is very desirable to do it well, and use at the same time as little material as possible. To do this much will depend on the shape of the fields. A certain length of fence will enclose more land in the form of a *square*, than in any other practicable shape. Hence fields should approach this form as nearly as possible. Again, the disposition of lanes is a matter of consequence, so as to avoid unnecessary length and fencing, and occupy the least quantity of ground.

But these rules may be materially affected by other considerations. For instance, it is very desirable that land of similar quality may be in the same enclosure. Some may be naturally too wet for any thing but meadow or pasture; some may be much *lighter*, and susceptible of ploughing, while others are not; some may be naturally sterile, and need unusual manuring, with green crops. All these should, as far as practicable, be included each in its own separate boundary. The situation of surface-drains, forming the boundaries of fields, may influence their shape; facilities for irrigation may have an essential bearing; convenience for watering cattle is not to be forgotten. Where, in addition to all these considerations, the land is hilly, still more care and thought is required in the subdivision, which may possibly require years of experience; but where fixed fences are once made, it is hard to remove them; hence a previous thorough examination should be made. A farm road, much used for heavy loads, should be made hard and firm, and cannot be easily altered; it should consequently be exactly in the right place, and be dry, level and short—the shape of adjoining fields even conforming to these requisitions; but a road little used should not interfere with the outlines of fields.



A specimen of laying out a farm is given in the preceding plan. It is of the very simplest kind, or a right-angled parallelogram, on nearly level land—a form that often occurs. It lies on one side of a public road, which is lined with forest trees. The middle enclosure on the road contains the dwelling, the barn, and other out-buildings. It is planted with trees for shade, ornament, and domestic employment—not set "all in a row," but in the graceful or picturesque style which distinguishes a beautiful natural landscape. On one side are the fruit, kitchen, and flower gardens—the lot containing them being oblong, to separate certain portions of the fruit garden for *pigs*—the sovereign remedy for the curculio; the orchard may occupy the lot adjoining. The remainder of the farm is divided into fields nearly square, each being entered from the lane by a good gate. These fields may be increased or lessened in size without altering the position of the lane. They should always be sufficiently numerous to admit a good rotation, and to separate at all times the pasture from the tillage land.

In laying out a farm with a very uneven surface, or irregular shape, it would be best to draw, first, a plan adapted to smooth ground, as the one just given; and then vary the size and shape of the fields, the distance of the lane from the centre, its straightness, &c., according to the circumstances of the case.

Fences.—The kind of fence used, and the material for its construction, must depend on circumstances and localities. A good fence is always to be preferred to an imperfect one; though it cost more, it will more than save that cost, and three times the amount in vexation besides, by keeping cattle, colts, and pigs out of fields of grain. A thriving farmer, whose whole land, except a small part with stone wall, is enclosed by common rail fence, with upright cedar stakes and connecting caps at the top, finds that it needs renewing once in six years. He accordingly divides his whole amount of fences into six parts, one of which is built new every year. All is thus kept systematically in good repair. Stone walls, if set a foot below the surface to prevent tumbling by frost, are the most durable fence. Hedges have not been sufficiently tried. The English hawthorn is not well adapted to our hotter and drier climate; and though sometimes doing well for a time, is not to be depended on. The buckthorn in New-England, and the Newcastle and Washington thorns in Pennsylvania and Delaware, have succeeded finely.

Gates.—Every field on the farm should be entered by a good self-shutting and self-fastening gate. A proper inclination in hanging will secure the former requisite, and a good latch, properly constructed, the latter. Each field should be numbered, and the number painted on the gate-post. Let the farmer who has *bars* instead of gates, make a trial of their comparative convenience, by taking them out and replacing them without stopping, as often as he does in one year on his farm, say about six hundred times, and he cannot fail to be satisfied which is the cheapest for use.

Buildings.—These should be as near the centre of the farm as other considerations will admit. All the hay, grain, and straw, being conveyed from the fields to the barn, and most of it back again in manure, the distance of drawing should be as short as possible. This will, also, save much travelling of men and of cattle, to and from the different parts of the farm. The buildings should not, however, be too remote from the public road ; and a good, dry, healthy spot should be chosen. The dwelling should be comfortable but not large—or it should, rather, be adapted to the extent of the lands. A large, costly house, with small farm and other buildings, is a bad indication of management. The censure of the old Roman should be avoided, who, having a small piece of land, built his house so large that he had less occasion to plough than to sweep.

The barn and out-buildings should be of ample extent. The barn should have space for hay, grain, and straw. It is a matter of great convenience to have the straw for littering stables, housed, and close at hand, and not out of doors, under a foot of snow. There should be plenty of stables and sheds for all domestic animals. This provision will not only save one-third of the fodder, but stock will thrive much better. Cows will give much more milk—sheep will yield more and better wool—and all will pass through the winter more safely. The wood-house near, or attached to the dwelling, should never be forgotten, so long as comfort in building fires and economy in the use of fuel, are of any importance.

A small, cheap, moveable horse-power should belong to every establishment, to be used in churning, sawing wood, driving mashing machine, turning grindstone, cutting straw, and slicing roots.

There should be a large root cellar under the barn, into which the cart may be *dumped* from the outside. One great objection to the culture of ruta-bagas and beets, in this country,—the difficulty of winter keeping,—would then vanish.

Both barn and house cellars should be well coated on the bottom and sides, with water-lime mortar; which is a very cheap and effectual way to exclude both water and rats.

Choice of Implements.—Of those which are much used, the very best only should be procured. This will be attended with a gain every way. The work will be easier done and it will be better done. A laborer who, by the use of a good hoe for one month, can do one quarter more each day, saves, in the whole time, an entire week's labor.

Choice of Animals.—The best of all kinds should be selected, even if costing something more than others. Not "*fancy*" animals, but those good for use and profit. Cows should be productive of milk, and of a form adapted for beef; oxen, hardy, and fast-working; sheep, kept fine by never selling the best; swine, not the *largest* merely, but those fattening best on least food. A Berkshire, at 200 pounds, fattened on 10 bushels corn, is better than a "land pike" of 300 fattened on 50 bushels.

Having now taken some notice of the necessary items for commencing farming, it remains to glance a litte at

SOILS AND THEIR MANAGEMENT.

Soils are of various kinds, as heavy and light, wet and dry, fertile and sterile. They all require different management, in a greater or less degree.

Heavy soils are often stronger and more productive than light; but they require more labor for pulverization and tillage. They cannot be ploughed when very wet, nor so well when very dry. Although containing greater or less portions of clay, they may be distinguished, as a class, from lighter soils, by the cloddy surface the fields present after ploughing in dry weather; by their cracking in drouth; and by their adhesiveness after rains.

Sandy and gravelly loams, also, contain clay, but in smaller quantity; so that they do not present the cloddiness and adhesiveness of heavy soils. Though possessing generally less strength than clay soils, they are far more easily tilled, and may be worked without difficulty in wet weather; they do not crack or break in drouths. Indian corn, ruta-bagas, and some other crops, succeed best upon them. Sandy soils are very easily tilled, but are generally not strong enough. When made rich, they are fine for some succulent crops.

Peaty soils are generally light and free, containing large quantities of decayed vegetable matter. They are made by draining low and swampy grounds. They are fine for Indian corn, broom corn, barley, potatoes, and turnips. They are great absorbers, and great radiators of heat; hence they become warm in sunshine, and cold on clear nights. For this reason they are peculiarly liable to frosts. Crops planted upon them must, consequently, be put in late—after spring frosts are over. Corn should be of early varieties, that it may not only be planted late, but ripen early.

Each of these kinds of soils may be variously improved. Most of heavy soils are much improved by draining; open drains to carry off the surface water, and covered drains, that which settles beneath. An acquaintance covered a low, wet, clayey field with a net work of underdrains, and from a production of almost nothing but grass, it yielded the first year forty bushels of wheat per acre—enough to pay the expense; and admitted of much easier tillage afterwards. Heavy soils are also made lighter and freer by manuring; by ploughing under coatings of straw, rotten chips, and swamp muck; and in some rare cases, by carting on sand—though this is usually too expensive for practice. Subsoil ploughing is very beneficial, both in wet seasons and in drouth; the deep, loose bed of earth it makes, receiving the water in heavy rains, and throwing it off to the soil above, when needed. But a frequent repetition of the operation is needed, as the subsoil gradually settles again.

Sandy soils are improved by manuring, by the application of lime, and by frequently turning in green crops. Leached ashes have been found highly beneficial in many places. Where the subsoil is clayey, which is often the case, and especially if marly clay—great advantage is derived from shovelling it up and spreading it on the surface. A neighbor had twenty bushels of wheat per acre on land thus treated, while the rest of the field yielded only five.

MANURES. These are first among the first of requisites in successful farm management. They are the strong moving power in agricultural operations. They are as the great steam engine which drives the vessel onward. Good and clean cultivation, is indeed, all important; but it will avail little without a fertile soil; and this fertility must be created, or kept up, by a copious application of manures. For these contribute directly, or assist indirectly, to the supply of nearly all the nourishment which plants receive; it is these, which, produced chiefly from the decay of dead vegetable and animal matter, combine most powerfully to give new life and vigor; and thus the apparently putrid mass, is the very material which is converted into the most beautiful forms of nature; and plants and brilliant flowers spring up from the decay of old forms, and thus a continued succession of destruction and renovation is carried on through an unlimited series of ages.

Manures possess different degrees of power, partly from their inherent richness, and partly from the rapidity with which they throw off their fertilizing ingredients, in assisting the growth of plants. These are given off by solution in water, and in the form of gas; the one as liquid manure, which, running down, is absorbed by the fine roots; and the other as air, escaping mostly into the atmosphere, and lost.

The great art, then, of saving and manufacturing manure, consists in retaining and applying to the best advantage, these soluble and gaseous portions. Probably more than one-half of all the materials which exist in the country, are lost, totally lost, by not attending to the drainage of stables and farm-yards. This could be retained by a copious application of straw; by littering with saw-dust, where saw-mills are near; and more especially by the frequent coating of yards and stables with dried peat and swamp muck, of which many parts of our State furnish inexhaustible supplies. I say *dried* peat or muck, because if it is already saturated with water, of which it will often take in five-sixths of its own weight, it cannot absorb the liquid portions of the manure. But if it will absorb five-sixths in water, it will, when dried, absorb five-sixths in liquid manure, and both together form a very enriching material. The practice of many farmers, shows how little they are aware of the hundreds they are every year losing by suffering this most valuable of their farm products to escape. Indeed, there are not a few who carefully, and very ingeniously, as they suppose, place their barns and cattle yards in such a manner on the sides of hills, that all the drainage from them may pass off out of the way into the neighboring streams; and some one mentions a farmer, who with preeminent shrewdness, built his hog pen directly across a stream, that he might at once get the cleanings washed away, and prevent their accumulation. He of course succeeded in his wish; but he might, with almost equal propriety, have built his granary across the stream, so as to shovel the wheat into the water when it increased on his hands.

The loss of manure by the escape of gas is often very great. The proof of this was finely exhibited by Humphrey Davy, in an experiment, performed by filling a large retort from a heap of fermenting manure, placing the beak among the roots of some grass. Nothing but vapor left the vessel, yet in a few days the grass exhibited greater luxuriance round the beak of the retort than any of the surrounding portions. Hence the superiority of unfermented manure—the rich portions are not yet lost. And hence, too, the importance of preventing this loss by an immediate application and ploughing into the soil, and also by mixing it in composts with muck, peat, swamp mud, and even common earth in a dry state,—and of preventing its escape from stables and yards, by a daily strewing with dried peat, lime or plaster.

The superiority of unfermented manure has just been mentioned, which is by many doubted. But the very facts on which these doubts rest, only prove its efficacy. For, they say, "I have always found fresh manure to be attended with little effect the first year, while it yet remains fresh; but afterwards, when fermentation and decay had taken place, the benefit was great and striking." But here is the proof at hand, that not until the rich, soluble and gaseous parts had well penetrated and been absorbed by the soil, was their powerful and invigorating influence exerted upon the growing plants. Fresh manure is generally in a state not readily mixed with soils; it is thrown into large lumps over the surface, some of which are ploughed in and others not, but none of them prove of immediate use to the crops. But on the other hand, fermented manure, from its ready pulverization, admits of an easy admixture. Let fresh manure be thoroughly ground down and worked into the soil by repeated harrowings, and two or three ploughings, and its influence will be like magic.

Swamp muck has often been spoken of as manure. But those who expect great and striking results from its application, will be disappointed, as the writer has been. Even with ashes, it is much less powerful than stable manure, not only because it possesses less inherent richness, but because it has less soluble parts, and consequently imparts its strength more slowly to growing plants. But this quality only makes it the more enduring. By decoction in water, vegetable mould loses a small portion of its weight by solution; but if the remaining insoluble portion is exposed to air and moisture a few months, another part may be again dissolved. Thus peat, muck and all decayed vegetable fibre, becomes a slow but lasting source of nourishment to plants.

But it is, when shoveled out and dried, to be mixed with farm-yard manure, as a recipient for its evanescent parts, that peat or muck becomes preeminently valuable. Some parts of the State abound with inexhaustible supplies in almost every neighborhood; many land owners have from twenty to a hundred thousand cubic yards on their farms, lying untouched, while half-starved crops are growing in the adjacent fields. There are whole counties so well supplied with it, that if judiciously applied, it would doubtless double their aggregate products.

All neat farming, all profitable farming, and all satisfactory farming, must be attended with a careful saving of manures. The people of Flanders have long been distinguished for the neatness and excellence of their farms, which they have studied to make like gardens. The care with which they collect all refuse materials which may be converted into manure and increase their composts, is one of the chief reasons of the cleanliness of their towns and residences. And were this subject fully appreciated and attended with a corresponding practice generally, it would doubtless soon increase by millions the agricultural products of the State.

But there is another subject of scarcely less magnitude. This is a systematic

Rotation of Crops.—If manuring is the steam engine which propels the vessel, rotation is the rudder which *guides* it in its progress. Ulike manuring, rotation does not increase the labor of culture; it only directs the labor in the most effective manner, by the exercise of judgment and thought.

The limits of this paper do not admit of many remarks on the principles of rotation. The following courses, however, have been found among some of the best adapted to our State:

I—1st *year*—Corn and roots well manured;
  2d *year*—Wheat, sown with clover seed, 15 lbs. per acre;
  3d *year*—Clover, one or more years, according to fertility and amount of manure at hand.

II—1st *year*—Corn and roots, with all the manure;
  2d *year*—Barley and peas;
  3d *year*—Wheat, sown with clover;
  4th *year*—Clover, one or more years.

III—1st *year*—Corn and roots, with all the manure;
  2d *year*—Barley;
  3d *year*—Wheat, sown with clover;
  4th *year*—Pasture;
  5th *year*—Meadow;
  6th *year*—Fallow;
  7th *year*—Wheat;
  8th *year*—Oats, sown with clover;
  9th *year*—Pasture, or meadow.

The number of fields must correspond with the number of the changes in each course; the first needing three fields to carry it out, the second four, the third nine. As each field contains a crop each, in the several successive stages of the course, the whole number of fields collectively comprise the entire series of crops every year.—Thus in the last above given, there are two fields of wheat growing at once, three of meadow and pasture, one of corn and roots, one of barley, one of oats, and one in summer fallow.

Operations in the order of Time.—The vital consequences of doing every thing at the right season, is known to every good farmer. To prevent confusion and embarrassment, and keep all things clearly and plainly before the farmer at the right time, he should have a small book to carry in his pocket, having every item of work for each week, or each half month, laid down before his eyes. This can be done to the best advantage to suit every particular locality and difference of climate, by marking each successive week in the season at the top of its respective page. Then as each operation severally occurs, let him place it under its proper heading; or, if out of season, let him place it back at the right time. Any proposed improvements can be noted down on the right page. Interesting experiments are often suggested in the course of reading or observation, but forgotten when the time comes to try them. By recording them in such a book under the right week, they are brought at once before the mind. Such an arrangement as this will prevent a great deal of the confusion and vexation too often attendant on multifarious cares, and assist very essentially in conducting all the farm work with clock-work regularity and satisfaction.

In reviewing the various items which are most immediately essential to good farm management, some of the most obvious will be —capital enough to buy the farm and to stock it well; to select a size compatible with these requisites; to lay it out in the best manner; to provide it well with fences, gates, and buildings; to select the best animals and the best implements to be had reasonably; to bring the soil into good condition, by draining, manuring, and good culture; to have every part under a good rotation of crops; and every operation arranged, so as to be conducted systematically, without clashing and confusion. An attention to all these points would place agriculture on a very different footing from its present condition in many places and with most farmers. The business then, instead of being repulsive, as it so frequently is, to our young men, would be attended with real enjoyment and pleasure.

But in all improvements, in all enterprises, the great truth must not be forgotten, that success is not to be expected without diligence and industry. We must sow in spring, and cultivate well in summer, if we would reap an abundant harvest in autumn. When we see young farmers commence in life without a strict attention to business, which they neglect for mere pleasure, well may we in imagination see future crops lost by careless tillage—broken fences, unhinged gates, and fields filled with weeds—tools destroyed by heedlessness, property wasted by recklessness, and disorder and confusion triumphant; and unpaid debts, duns and executions, already hanging over the premises. But, on the other hand, to see cheerful-faced, ready-handed industry, directed by reason and intelligence, and order, energy, and economy, guiding the operations of the farm—with smooth, clean fields, and neat trim fences—rich, verdant pastures, and fine cattle enjoying them, and broad waving meadows and golden harvests, and waste and extravagance driven into exile, we need not fear the success of such a farmer—debts cannot stare him in the face, nor duns enter his threshold.

It is such enterprise as this, that must place our country on a substantial basis. Agriculture in a highly improved state, must be the means which, next to the righteousness which truly exalts a nation, will contribute to its enduring prosperity. All trades and commerce depend on this great art as their foundation. The cultivation of the soil and of plants was the earliest occupation of man; it has in all ages been his chief means of subsistence; it still continues to furnish employment to the great majority of the human race. It is truly the great art of peace, as during wars and commotions it has languished and declined, but risen again in strength and vigor when men have lived at peace with each other—it has then flourished and spread, converted the wilderness into life and beauty, and refreshed and adorned nature with embellished culture. For its calm and tranquil pleasures—for its peaceful and healthful labors—away from the fretful and feverish life of crowded cities,—"in the free air and beneath the bright sun of heaven,"—many who have spent the morning and noon of their lives in the anxious cares of commercial life, have long sighed for a scene of peace and quietude for the evening of their days.

MOUNT AIRY,

NEAR PHILADELPHIA,

THE RESIDENCE OF JAMES GOWEN, ESQ.

We derive great pleasure from being enabled to incorporate in our book, the following Report of Mr. Gowen to the Committee on Farms of the Philadelphia Agricultural Society, together with portraits of two of his superior animals. Although Mr. Gowen's command of pecuniary means undoubtedly secured him advantages in accomplishing his purposes possessed by comparatively few, yet his success demonstrates what *can* be done by capital backed by skill and energy in rendering Farming operations profitable; and the Report will be interesting and valuable as affording a standard at which all may *aim*, and approach according to their ability.

"The example and success of Mr. G." says the American Farmer, "has stimulated many a son of the soil to perseverance, and has established for him a fame more to be prized than laurels gained on the field of blood, as his trophies carry peace and plenty with them, and are unattended with the wailings of the widow and the orphan."

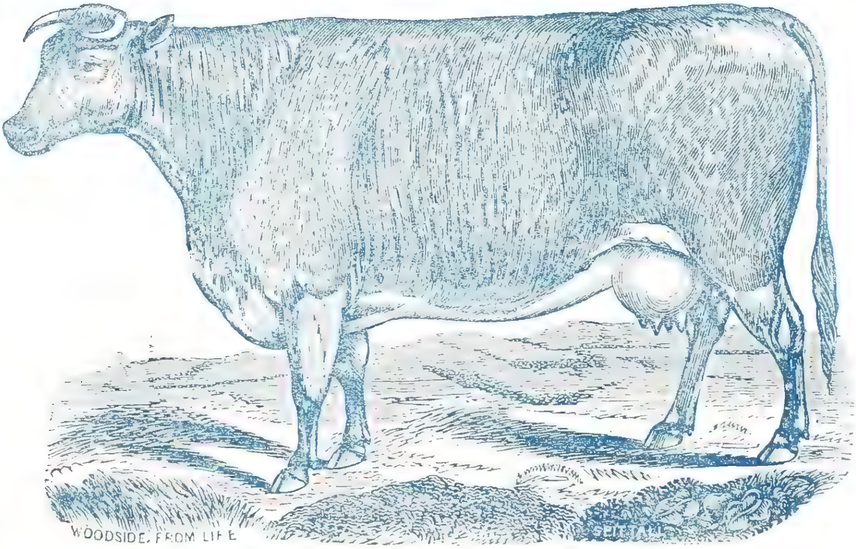
JAMES GOWEN'S REPORT TO THE PHILADELPHIA AGRICULTURAL SOCIETY.

To the Committee on Farms:

Gentlemen,—It is known to most of you, that since I became a farmer, I have spared no pains to fulfil the duties of the calling, in a manner creditable to the community in which I live, as well as to myself and the Agricultural Society to which I belong—that while improving my own practice, I have endeavored, by sundry means, to stimulate others to compete with me in spirited efforts, to arrive at excellence in the highly useful and delightful pursuits of agriculture; and to promulgate as far as in me lay, such improvements and results, as were likely to promote the general interests of the farmer. In carrying out this object, I have, as part of the system, always been found competing in crops and cattle, for the premiums offered by "The Philadelphia Society for promoting Agriculture." It is therefore in accordance with this practice, that I now present my farm, as worthy of note, when you come to award the premiums committed to your distribution; in view of which, and in fulfilment of the rules and regulations of the Society, I submit for your consideration a general statement of its character and condition.

The homestead Farm contained, when I removed to it in 1834, about 60 acres; since then I have added to it by purchase, some 40 acres, all of which is contiguous; making over 100 acres, exclusive of the Woodland Farm in Cheltenham township, Montgomery county, part of which is cleared and worked by me, and is in fine condition, as you may recollect from my communication on the crop of rye, raised there in 1842.

From long neglect and a bad practice, previous to my coming on the Homestead, I found it in every respect in a wretched condition. The result of bad ploughing and bad seeding, were visible in the unevenness of the surface, and the pernicious weeds that seemed to have entire possession. I at once took up the old fences which divided about 40 acres into small fields, ploughed it up, eradicated the briars and brambles that filled so large a space along those fences, and removed the stones within ploughing depth. It was cropped according to circumstances—alternately with potatoes, corn, grain, &c., until the soil had been brought into proper subjection in the fall of 1839; when it was laid down for grass, by sowing it with grain and timothy; since which it has not been disturbed, with the exception of about eight acres in rye, this year; and yet this last summer it cut, I may safely say, two tons to the acre, and expect it to do as well next summer, should the season prove favorable. By this practice I brought every inch of the land to bear, and saved ten years expense, or wear and tear of the six fences which formerly stood inside this section. The fields in future will be divided by hedges of the *Maclura thorn*, or *Osage Orange*, raised by myself; four of these hedges already in, with plenty of quicks on hand to supply the remainder. These remarks, you will please observe, apply to the land lying on the south-east side of the lane that divides the farm. The land on the north-west side, opposite, called the Spring fields, was, if possible, in a still worse condition. Owing to the swampy nature of part of it, and the washings from the higher lands on the other side the lane, the posts were every spring thrown out of place as the frost left the ground, while the ravines, furrowed out by thaws and heavy rains, set at defiance all attempts at cropping or farming. To obviate the yearly setting up of the fences, which was not only expensive, but vexatious, I substituted a stone and lime wall for the post-and-rail fence. The wall is about half a mile long, is two feet below the surface at every point, two feet broad at base, and averages over six feet high from the bottom, ending with an eighteen inch coping. One large under drain, with grating at mouth, takes the water from the lane, while several smaller drains keep the surface of the land perfectly dry. The ravines were well filled up, and ever since, for a series of years, good crops of potatoes, corn, grain and grass, have been taken, where formerly grew spatterdock and rushes.



PORTRAIT OF "DAIRY MAID,"—THE PROPERTY OF JAS. GOWEN, Esq., OF MOUNT AIRY.

[*Dairy Maid, after suckling her calf three months, yielded in one week 225½ quarts of strained milk, being on an average 32 quarts per day. The next summer, after suckling another calf 3 months, she yielded in one week 235¼ quarts, being more than 33½ quarts per day.*]

The land added to the farm at sundry times within the last five or six years, was, in the general, in as bad a condition, in many respects, as the worst of that already described: indeed, it could furnish material for a more repulsive picture than any that has been drawn yet; but as most of you have repeatedly seen it in its original state, I need not trouble you with a description. To show its condition now, I need only remind you, that two years ago I obtained a premium for raising upwards of four hundred bushels of Mercer potatoes to the acre, on this land; and that on the succeeding year, from the same potatoe land I took upwards of fifty bushels of wheat to the acre, without any additional manure. Also, that last year I submitted a field of some seven acres of corn, on another portion of this land, which yielded at the rate of 200 bushels of ears, equal to 100 bushels of shelled corn to the acre. My reports on the condition of these fields, and the aforesaid crops, are in possession of the Society. The corn land was in this year with potatoes and oats. The potatoes, four acres, yielded over 200 bushels to the acre; the oats were very good.—It is now laid down with wheat and orchard grass. This sketch, with your own personal observations, will afford you some idea of what I had to contend with, and what I have accomplished in the way of improving land, and the present condition of my farm.

From the difficulty and expense in procuring manure from the city, and after three or four years experience in that mode of supply, I gave it up, and adopted the plan of making a supply on the place, by an increased stock of cattle; from which I have derived my sole supply ever since, with the exception of light dressings of lime and gypsum, and a small lot of stable manure which I was tempted to purchase a few weeks since at auction, and which I can dispense with, should I meet with a purchaser before its removal in the spring. The keeping and breeding fine stock had in itself strong claims upon my judgment, as well as my taste; as I could never think a farm was what it should be, unless it could exhibit fine cattle, as well as an improved culture. To maintain this stock, and bring my land to a high state of cultivation, by the most efficient and economical practice, has been a leading object: and to accomplish this, required no ordinary management on such a farm. The stock in cattle has ranged for years, from forty to fifty head, in addition to the necessary horses, with a large stock of swine for breeding and fattening; and these I have fed from the produce of the farm, except the purchasing occasionally of some straw, and supplies of mill feed for the horses and swine, and some meadow hay for the cattle, selling frequently its equivalent in timothy. During the same period I have sold hundreds of bushels of rye, some wheat, and on an average, four hundred bushels potatoes annually, with some three to four hundred bushels of carrots, besides providing for the family. But the chief income was derived from the cattle, of which I shall speak more at large presently.

My expenditures during the whole period, could not be otherwise than large; as I could not put up so much stone fence, and picket fence, as enclose my farm, without incurring a heavy outlay; but I view these improvements as cheap in the end. It may be safely inferred, that there is not at this day, any farm of the same extent in this part of the country, that can so easily be worked, or will require so little expense for a series of years in keeping the fences in order, especially when the hedges are taken into account. I am also of opinion, that taking in view the condition of the soil, as to depth and richness, as well as its being entirely free of stones and other impediments, that I can make it produce as much as any farm of its size in any part of the country, for a series of years, and at as small an expense.

The secret of keeping so large a stock on so little land, consists in my practice of partial soiling, and green crops, whereby I make some four to five acres do the work of thirty acres, in the "slow and easy go way."

WOODSIDE Del.
MUMFORD Sc.

LEANDER—SON OF DAIRY MAID.—THE PROPERTY OF JAMES GOWEN, Esq.

From May to August, my cattle are confined to one or two fields, most commonly one, to which they are driven, more for exercise in the cooler parts of the day, than for pasture; they being fed in the stables, early in the morning, at noon, and at night, with food cut for them from a lot adjoining the barnyard. This food is generally of lucerne, orchard grass and clover, oats and corn. The patches from which the corn and oats are cut, are always sowed with turnips in August. No one can credit, unless he has had proper experience in the matter, the quantity of food that one acre of lucerne, one of rich orchard grass and clover, and one of oats and corn, afford from May till August, nor can he estimate the great saving in manure, much less the comparatively good health of the cattle, from not being exposed on naked fields, under a fervid sun, toiling all day in search of food. This practice allows me to crop almost the whole of the land, and to make some 120 to 150 tons of hay annually. In the fall, from August till November, the cattle have the whole range of the mowed lands, as I do not cut second crop grass for hay. Then for winter feed, I have always an acre of sugar beet, half an acre of sugar parsnips; half an acre or more of carrots, for my horses; and generally three to four acres of turnips. I report to the Committee on Crops this season, over 100 tons of these roots. In 1843, I gathered from one acre, 1078 bushels sugar beets, 60 lb. to the bushel; carrots at the rate of 687 bushels; sugar parsnips 868 bushels. This year 672 bushels sugar beets; 970 bushels carrots; 700 bushels sugar parsnip; and from three and a half acres, 2500 bushels of turnips, sowed with timothy seed.

The farm buildings consist of three substantial stone barns, one 70 feet by 33, another 50 by 26, and another hipt roof with cupola, 57 by 25, besides a large overshoot stable and hay house, stable high of stone, 60 feet by 30—the floors of all these are made of broken stone and lime, planked, being vermin proof. There are also a corn crib capable of holding 1200 bushels corn; one barrack, ample hog pens, and sheds for carts and wagons. The barn buildings have been filled this fall to their utmost limit, except the corn crib.

A substantial stone wall encloses the principal manure heap; the drainings from this heap are led into a place of deposit, in which are received also a drain that runs under ground from the kitchen, as well as drainings from the pig pens, and the washings from all the yards. These drainings form an important item in the supply of manure to my land; it is a saving which I cannot estimate at less than $200 a year. This liquid, by a simple process, is applied to the patches of roots, &c., and to this may be ascribed my great success in raising such crops.

The dwellings, green house, shrubbery, and gardens, I need not describe; but it is in point to notice the nursery of young ornamental trees, and Maclura for hedges, raised on places mostly waste on other farms, from which I have an ample supply for my own setting out, and a considerable stock to spare of Magnolia Tripetalla, or Cucumber tree, and Silver Maple, of fine size, suitable for transplanting. I sold over fifty dollars worth last spring of these trees, and have several hundred dollars worth still on hand.

Of *Improved Cattle*, my first effort was with the celebrated "Dairy Maid," still owned by me. Her first calf, LEANDER, by *Whitaker's* PRINCE OF NORTHUMBERLAND, was reared, and kept by me, for breeding.—DAIRY MAID's calves alone, exclusive of Leander, have already sold for more than $500. It would be curious to trace her profit at this day, by stating an account of her first cost, her keep, and that of her son Leander; crediting her by sales of her own calves and grand calves; deducting for the portion of capital which was invested in the dams that produced the grand calves. To do this would extend this paper to an unusual length—suffice it to say, that Dairy Maid has long since paid for herself, and that those who laughed at me for giving $540 for one cow, may turn this statement over in their minds, and think, whether since 1838 any investment of theirs, to same amount, in any other branch of husbandry, has paid so well. But they may exclaim, "I cannot do the like again;" yes, I can—for if the price of fine cattle be reduced through their becoming plentier, (thanks to those who made them plentier,) the principal invested may not be so large, in the purchase of one animal to begin with, but there cannot be a doubt if she be superior or superlative, the produce of such an animal will realise as good a per centage in future, as did that of Dairy Maid. But there is a satisfaction beyond that of the pocket, and that is, that Dairy Maid's breed will be of infinite service to the country. Her calves and grand calves, are pretty well scattered already—and I make no doubt, but wherever found they will demonstrate the high character of the parent stock.

My sales for the last two years, exclusive of Dairy Maid's calves, amount to over $2000. The stock now on hand is about 40 head, principally Durhams, among which are Dairy Maid, Cleopatra, Walnut Victoria, Ellen Kirby, Miss Model, Victorina, Jude, Bessy Bell, &c., &c. The butter sold for the last two years exceeds $750; this is a respectable item when the calves that were reared, and the supply for my family are taken into view. From early fall to spring, the butter averaged 70 lbs. per week—the quality highly appreciated abroad, as well as at home. In butter, cream and milk, there is no stint at Mount Airy; so of fruits, vegetables, hams, &c. If I be a large producer, I may be also classed as a large consumer, and did I not produce, the markets would have to suffer accordingly.

In the hog line, I have been quite successful, at least in bringing the animal, by judicious crossing, to great perfection. I fatted off my old Lincoln, and Berkshire Boars, and my Hampshire and Chester county Sows, last month; they weighed from 400 to 450 lbs., sold for $86,24. Have sold the last two years of pigs, designed for breeding, $150. Bacon, lard, &c. over $120, besides, having on hand 14 fine young barrows, last fall's pigs, now ready for slaughter, which will weigh from 250 to 300 lbs. each, value $150. The stock on hand consists of one fine boar of Lincoln, Hampshire and Berkshire breed; one brood sow of Berkshire breed, 12 shoats and seven pigs. The sow and pigs are the same that took the premium at the last Agricultural Exhibition.

Building and work, independent of the farm, induced to the keep of a heavy stock of working horses, consisting of five, employed occasionally hauling stone, sand, &c. They are the same horses originally purchased, at and since the commencement of my farming operations; having neither *sold*, *lost* nor *exchanged one*. The two carriage horses average 20 years old each; my favorite of these, is quite 25—so much for management in this department. The implements—wagons, carts, ploughs, harrows, &c., &c., are in keeping with the farm, and are well kept, as you may have observed.

I keep no farmer on the place, in the character of manager, having never as yet been able to find a man qualified to conduct the operations of the yard and field, in manner as they should be. My practice is, to hire one man for general work, at $20 to $25 per month, also, two hands for out-door work alone, who are capable to work at any job of farming; they have employment from early spring till first of December, at 75 cents per day—these three find themselves. Then, there are two men engaged constantly, feeding and taking care of cattle, feed, manure, &c., who receive from $10 to $12 per month, and found. By this arrangement I have always a pretty strong force to act on emergencies, and to avail myself of seasonable operations. My work is generally well done and timely done.

I have thus given you a general insight into the condition of my farm, and the system by which it has been brought to its present state of perfection. If substantial fences, clean fields, well worked land, good crops, good barns, and splendid cattle, be essential to constitute a good farm, I trust you will find none of those features wanting on mine.

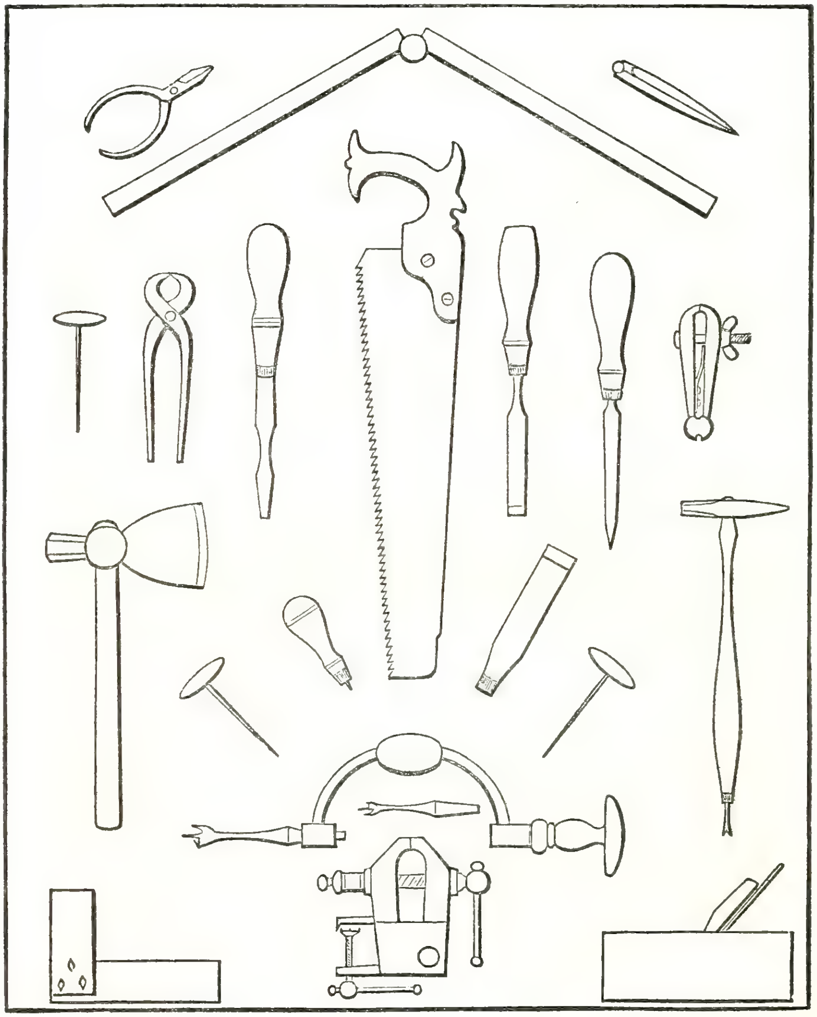
Very respectfully, your obedient servant, JAMES GOWEN.

Mount Airy, Dec. 24th, 1844.

FARMERS' ACCOUNTS.

The advantages of clear accounts are obvious in every pursuit of life; yet strange as it may appear, the making of a few rough memoranda or figures, to yield a *gross* account of the general receipts and expenditures, usually constitute the utmost efforts which are made by the majority of farmers who profess to keep accounts. There should be a journal kept of the state of the weather, with an account of the thermometer, barometer, wind, rain, &c., having a column for each, and opposite to them the days of the week. There should be a weekly account of labor, with names of laborers opposite the days of the week, and a column at the end of each for money paid per day; a daily journal of transactions; a monthly account of cash, with dates, sums received, and sums paid, of whom received and to whom paid; a weekly account of milk, butter and cheese, noted each day; a current account of grain crops, with description, date of sowing, thrashing, consumption, sale, and to whom sold, with the price; a current account of hay crops with date, a description, number of acres stacked, quantity cut, consumed, sold and to whom, with price; and lastly, a monthly account of live stock, with description of number, increase by purchase and birth, sale, decrease by sale, accidents, consumption, and total remaining in stock, and a column for remarks, of sickness, of the effects of medicines, &c.

A SEPARATE PLACE FOR EACH THING, AND EVERY THING IN ITS PLACE.



ORDER—CAREFULNESS.

A SEPARATE PLACE FOR EACH THING, AND EVERY THING IN ITS PLACE.

——"Order was Heaven's first law,
Earth's first blessing."——

If we properly considered our true interest, and indeed our own convenience, we should be led to see the importance of the moral influence resulting from *habits* of *order*.

Even children perceive the beauty and advantages of care and neatness, and almost instinctively acquire the practice, from the example of those with whom they are associated.

Some persons plead, they have no turn for such things; and therefore they are excusable for their neglect. But this is a mistake. The real difficulty arises from a feeling of which some are scarcely conscious, and which few are frank enough to acknowledge. Is it not to save ourselves a little trouble? Is it not self-indulgence? To be plain—is it not indolence? And does not the indulgence of this feeling cause more of our troubles and difficulties than many are aware of?

For instance,—if we have unnecessarily neglected a duty, or have left an article out of place, which might as well have been returned at the time; if we have done a thing indifferently, which ought to have been done well—or if we have failed to accomplish an object for want of due exertion—what is the reason? Let us be honest, and examine it fairly. Is it not that we have given way to the feeling spoken of? And do we not find that this feeling gains strength by indulgence? But how are we to get rid of it? The reply is, we must contend against it, and show it no quarter; and little by little we will gain the mastery. Early life is the best time to eradicate it; but it will yield to proper efforts, at all ages.

You ask,—how is this to be effected? The answer is, by *learning to love labor*. But to do this, you must study to make every kind of business a pleasure. To a great extent this can be done. For by carefully digesting, and then adopting the most simple and systematic mode of performing every duty, greater precision and success will be attained; and being simplified and made easy, the performance will become a pleasure. For no position is more true than this—*Whatever we feel we do well, we take pleasure in doing:* and is not the converse equally so? Whatever we feel is not well done, affords us no satisfaction. If, therefore, we learn to do everything well, will not the doing of everything then be a pleasure? Does not this correspond with our own experience?

Difficulties will frequently occur, but these must not dishearten us, as nothing valuable can be accomplished without effort; and for our encouragement we should always bear in mind that there is a way of doing everything, and if one method fails we must try another.

The principles of order and of neatness are so simple and so plain, that it needs but moderate attention to understand them, and but reasonable effort to put them in practice; but that effort must be continued and persevered in, until we succeed. For step by step we shall gain on our deficiences; and the consciousness of some progress will encourage further exertion. We should never forget that to become fitted to train others, it is especially needful we should first discipline ourselves.

An eminent and successful agriculturist, when asked what made a good farmer, replied, "To mind little things." When we visit a neighbor who is remarkable for good management, we are struck with the peculiar effect and beauty of his arrangements; although perhaps at first we can hardly tell why. But when we come to analyze, we discover it is the result of attention to "little things;" providing places for things, and keeping them in their places.

If, when we enter a house, we see scraps of paper, rags, and pieces of thread scattered over the floor—if the dress of the housewife has been thrown upon her without care, and perhaps soiled and torn—if her children are disorderly, uncombed and uncleanly, does it not affect us unpleasantly?—and, accustomed to better management, do we not turn from it with disgust? Are we at any loss to determine that indolence is the cause of all this? Can we doubt that if the housewife had properly attended to "little things,"—was an early riser, and had made the best of her time—that her room, her dress, and her children, would have been entirely the reverse, and instead of an offensive, would have presented an inviting appearance? For what is more becoming than a neatly dressed woman? or more delightfully interesting than a family of clean and orderly children?

The mere circumstance of a small bag being hung up in each room, and the scraps regularly deposited there, will promote habits of care and tidiness, beyond what could have been anticipated. This may seem a small matter, but it is the *beginning* of order; and if strictly followed up, its influence will be felt throughout the whole family.

But may not the same principles be applied elsewhere? Is there nothing to be done on the outside of the house? Let us examine; how is it with the fences and the hedges, and the appearance of the dwelling? Are they all snug? Have you a supply of choice fruit trees convenient? And of such grapevines as will stand the winter, and are they kept well trimmed? Have you a wood-house? Is it well supplied with fuel, and neatly arranged? How is it with the garden, and the front yard—and the lane—and the barn-yard, and the barn? Are they in good condition? Have you scrap-bags there?

or in other words, have you suitable places for unsightly things; for such things as cause disorder and litter your premises; and serve as examples of mismanagement and waste to those about you? If you have not, why is it? How can you expect them to be careful, when you are careless; to be industrious, when you are slothful; and to be saving, when you are wasteful? If you permit this state of things, do you not encourage it? and is it not really teaching them the reverse of what your interest requires? Do you not see it? If you do, then rouse up to your duty; and set a better example for the future. For do you not remember that whenever you have done so, how pleasant has been the result? Shall the example of a wise Providence be lost upon us, and shall we not be improved by what was intended for our instruction as well as our benefit? Observe the operations of nature! How beautiful! How admirably adapted to their end!—the order—the regularity—the wonderful economy!—nothing in vain—nothing wasted—nothing lost!

But you say you have not time to attend to these things: are you aware how much of your time, as well as your property, will be saved in the end? In laborious matters we may be industrious, and yet omit small ones through negligence.

You rise early, of course, but is all your time employed to the best advantage? Do you note the fragments of it that are wasted by yourselves, and by those around you? You see then it is not for want of time; it is for want of properly employing it—it is for want of method; and no one can fill up the full measure of his usefulness without it. You are saving of your money, then why not economize your time?

We should all remember that it is our duty, and indeed our interest, to instruct others as well as to improve ourselves; and it may be truly said, that he who can accomplish and teach others to perform with ease a double amount of duty, is as much a benefactor as he who causes the "two blades of grass to grow where but one grew before." To assist you in the object contemplated, provide a small book with but *two leaves*, and as they occur to you, note in it such little matters as may require care; you will then be able to attend to many things which are now neglected, because not thought of at a leisure time. But this book must be examined *daily*, and cleaned up as often as possible; for if the items are suffered to accumulate, the book will lose its virtue.

Are there not some other things to be looked after? Where are your implements of labor—your ploughs, your harrows; your hoes and your shovels; your forks; your rakes and your scythes? Are they in good condition, and in the proper places; or are they scattered about and exposed to the weather, and some of them mislaid, or lost?

Have you a tool house? Have you a workshop? If you have not, there must then be some disorder; and is not that the cause? For a deficiency of care in one respect generally leads to it in others; and it is the *habit* of care you must acquire.

Would you know the secret of having things *kept in their places?*

Then provide suitable places for them, and have a distinct and separate place for each.

But these places must be convenient and easy of access; and the articles must be arranged with some taste, and so as to produce a pretty effect. This will be pleasant to the eye, and will awaken a feeling of interest in those in your employ, and each one will take pleasure in promoting the object. To *insure* success, however, you must go further. You must mark in *outline* the exact shape of each article upon the wall or partition against which it may be placed. Try it, and you will be astonished at the result; it will act like a charm in restoring things to their places. And from it you will derive a further advantage, as you will thereby be enabled at a glance to see exactly what implements and tools belong to you, and more pains will be taken to keep them fit for use. And if they at any time should be left out of place, or be lent to a careless neighbor, you will be continually reminded of it until they are returned, and thus often saved from loss.

The good effects of the plan will not stop here, for its successful operation will be a valuable example in the neighborhood, and a practical illustration of the beauty and usefulness of *order*.

It will also serve to fix in the minds of those about you, a *principle* applicable in various other forms, and it will gradually produce an effect upon their habits that will, more or less, influence all their conduct.

MIQUON.

NOTE.—The diagram at the head of this article is a copy of a closet recently fitted up, and comprises most of the tools that would be needed for a family. For a farmer, a greater variety would of course be required. But the design of the plate is to show that any set of tools or implements may be so arranged as to present a symmetrical and tasteful appearance; by selecting some prominent article as a point or centre, and radiating, or otherwise arranging the others arounds it.

The tools are secured in their places by *staples* made of wire, and by small brass or iron hooks, or by nails. One of the awl handles is hollow, and contains about a dozen blades of different shapes, each of which will fit firmly into the other handle. The shape of the tools as there represented, was marked out by a small stiff brush, and with ink. The cost of the tools at retail price, was $8 67.

[*Farmers' Cabinet.*

THE GOOD OLD PLOUGH.

Let them sing who may of the battle fray,
And the deeds that have long since past—
Let them chant in praise of the tar whose days
Are spent on the ocean vast.
I would render to these all the worship you please,
I would honor them even now,
But I'd give far more from my heart's full store,
To the cause of the good old Plough.

Let them laud the notes that in music float
Through their bright and glittering halls,
While the armorous twirl of the hair's bright curl
Round the shoulder of beauty falls—
But dearer to me is the song from the tree
And the rich and blossoming bough—
O, these are the sweets which the rustic greets
As he follows the good old Plough.

Then how jocund the song as it comes along
From the ploughman's lusty throat!
Did the hunter's shout ever yet give out
To the brown woods a merrier note!
Tho' he followed no hound yet his day is crowned
With a triumph as good, I trow,
As though antlered head at his feet lay dead,
Instead of the good old Plough.

Full many there be that we daily see
With selfish and hollow pride,
Who the ploughman's lot in his humble cot
With a scornful look deride;
Yet I'd rather take, aye, a hearty shake,
From his hand than to wealth I'd bow—
For the honest grasp of that hand's rough clasp
Hath stood by the good old Plough.

All honor be then to these good old men
When at last they are bowed with toil;
Their warfare then o'er, why they battle no more
For they've conquered the stubborn soil—
And the chaplet each wears are his silver hairs—
And ne'er shall the victor's brow
With a laurel crown to the grave go down
Like these sons of the good old Plough.

THE FARM.

SIMPLE OPERATIONS OF TILLAGE.

It would be proper, in this place, to introduce a chapter on the *Agricultural Implements*, &c., of the farm, a subject which all will admit to be important in this connection ; but we feel compelled, in view of our space and the various subjects yet to be embraced, to omit any special reference to them. We do this the more readily, because the progress of invention and improvement in these implements is so steady that what may seem to be the best of its kind at this time may be soon superseded by something still better. Besides, every farmer will, as a matter of course, select the best implements within his reach, and in doing so be guided by his own judgment and the experience of others. The inventive genius of our countrymen is accomplishing a great deal for the agriculturist, in diminishing his labor, and facilitating the operations of his business ; and every farmer should make it his business to examine the various inventions and improvements that are from time to time brought to notice, and procure such as he is *sure* will suit his wants and promote his interest.

On the subjects of Ploughing, Harrowing, Rolling and Digging, more, also, might be said than our space will allow. These are practical operations which every tiller of the soil is or ought to be sufficiently master of to conduct under the guidance of his own skill and judgment, and to *improve* upon as influenced by the true principles of his art, which it is our aim to present to him clearly in this work. In regard to Ploughing, we may say, in the language of the late Mr. Wiggins, author of the "American Farmers' Instructor," that as the perfection of good ploughing can only be attained by *practice*, it must be evident that nothing like a system can be framed for the operation on every diversity of soil. It must be apparent that, as every kind of soil has its appropriate qualities, each requires a peculiar mode of tillage. Ploughing, which is the chief operation, ought therefore to be executed according to the nature of the land, and not performed upon any one invariable principle.

On strong clays and loams, and other soils of a deep or rich staple, the plough should go to a considerable depth; whereas, on thin clays and sands, the benefit of deep ploughing is very questionable, especially when incumbent on a sterile sub-soil. On each description of land, distinct modes of operation, and implements of different construction, are therefore absolutely necessary.

Very opposite opinions are entertained by many eminent farmers regarding the proper *depth of ploughing*. But as yet, the application of deep or shallow tillage, to various soils respectively, has not been ascertained upon any settled principle.

The proper depth of ploughing must necessarily depend upon the nature of the soil; but although every intelligent husbandman must be aware of the superiority of those of a deep staple over those which are shallow, still it should be borne in mind that there is a wide difference between the effects of ploughing deeply into land, the vegetable stratum of which is of nearly equal fertility throughout, and that of augmenting a shallow surface of fertile soil, by mixing it up with a sub-soil of inferior quality.

Soils of the very best quality, may be completely exhausted in the course of a few years, by *shallow ploughing;* so on the other hand, soils of an inferior quality, by a judicious system of ploughing, may be greatly improved in the staple. This course is recommended to increase the depth of the soil of uplands.

PREPARATION OF LAND FOR TILLAGE.

Fallowing in agriculture (says Wiggins) is the mode of preparing land, by ploughing it a considerable time before it is ploughed for seed. Lands are laid fallow either during the summer, or during the winter, according to the nature of the soil and the judgment of the cultivator.

By a fallow is understood a portion of land on which no seed is sown for a given period—usually a year. The object is the exposure of the soil to the action of the atmosphere—the destruction of noxious weeds, &c., by the frequent ploughings and harrowings to which the field is subject. By many it is supposed that the fertility of the soil is increased by this process, and at an expense much less than could be accomplished by the application of manures.

The practice has existed from the earliest ages. The Romans with their agriculture introduced fallows in every part of Europe, where it is generally in universal practice, with the exception of Great Britain. But as a crop was lost every year they occurred, a powerful aversion to *naked* fallows arose, about the middle of the last century, in which some of the ablest cultivators of the day entered the lists, and exhausted, perhaps, all the legitimate arguments on both sides. **Arthur Young** labored assiduously to substitute *fallow crops* for the *naked* fallows then in general use.

Yet the practice does not appear to have given way, but rather to have extended on wet tenacious clays—and it is on such grounds only that any one now contends for the advantages of fallowing. The expediency or inexpediency of pulverizing and clearing the soil by a bare fallow, is a question that can be determined only by experience and not by argument.

The principal advocates of fallowing at the present day, contend for it only on heavy soils, which they say it is often impossible to keep free of weeds—in wet climates—and unfavorable seasons. Under draining, where the soil is cold and wet, is to be recommended, and the whole process of draining, and fallowing to be effectually done. By this means the succeeding crop will be ample, and the subsequent produce of clover equally so. Yet their advice to the cultivator is—Avoid fallowing, if you can keep your land clear; but when you fallow, do it effectually, and improve the soil at the *same time*, by the application of lime, marl, &c., as circumstances may enable you to do. In dry weather, spare neither the plough nor harrow. The stitches must, before winter, be laid high and dry, and the water furrows made fair by the spade or some suitable implement. By this process it is asserted that the stiffest land may be brought into a state of high cultivation.

It should be remembered that the climate of Great Britain is essentially different from that of every part of this country; our summers are much warmer, and our atmosphere much drier. Nor do the cold and stiff soils, which compose three-fourths of that island, abound extensively in the United States; though mostly, where prevalent, in the northern part.*

On the whole, it may be set down as a general rule, that summer fallowings are not necessary in this country—certainly not on any smooth, level and dry soil; and in no case where a suitable rotation of crops can be followed.

Fallowing was necessary as long as grains only, all of which exhaust the soil, were cultivated; during the intervals of tilling the fields, a variety of herbs grew in them, which afford food for animals, and the roots of which, when buried in the soil by the plough, furnished a great part of the necessary manure. But at this day, when we have succeeded in establishing the cultivation of a great variety of roots and artificial grasses, the system of naked fallowing can be no longer supported by the shadow of a good reason.

The scarcity of dung occasioned by the limited number of cattle that could formerly be maintained upon a farm, caused the custom of fallowing to be continued; but the ease with which fodder may now be cultivated, furnishes the means of supporting an increased number of animals—those in their turn supply manure and labor—and the farmer, is no longer under the necessity of allowing his lands to lie fallow.

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* Our American farms are from ten to fifteen degrees *south* of the farms of England, yet so keen are our frosts, and so sudden and frequent are the changes from thaw to frost, that common turnips do not stand the winter in our fields. The climate and the soil of America may be believed to differ greatly from those of England.—*Bordley's Husbandry.*

Artificial grass lands ought now to be considered as forming the basis of good agriculture. These furnish fodder, the fodder supports cattle, and the cattle furnish manure, labor, and all the means necessary to a thorough system of cultivation.

The suppression of the practice of fallowing, is then equally serviceable to the cultivator, who increases his productions without proportionally increasing his expenses; and to society, which derives from the same extent of soil, a much greater quantity of food, and additional resources for supply.

LEVELLING GROUND AND REMOVING OBSTRUCTIONS TO TILLAGE.

The most frequent impediments to the common operations of tillage are, swamps, inequalities of the surface, stones, the roots of trees, and the like. The curing or removing of swamps is a branch of draining. The levelling of ground, and the removal of stones, and similar obstructions, are to be attended to in common operations of tillage.

When the surface of ground is unequal, the plough will suffice for levelling it in common cases of tillage. The plough is made to act in this case by repeated cleavings of the land to be levelled. Frequently the surface is previously removed by the spade, so that the soil may be replaced upon the new surface after it has been rendered level. In some cases, machines, constructed for the purpose, are employed in the levelling of ground.

FALL PLOUGHING.

UNDER WHAT CIRCUMSTANCES TO BE RECOMMENDED.—ON THE ILL EFFECTS OF PLOUGHING LAND WHEN WET.

There are few points of Husbandry, (says the Farmer's Library) about which Farmers differ more in practice, than about Fall Ploughing; and this difference, like most others, occurs from want of reflection on the *principles* that should govern the particular cases—or rather, we might say, from want of knowledge of the principles, or *reasons* involved in every agricultral problem. You shall sometimes see a farmer turning his "glebe" at every odd time he can catch of open weather, in Fall and Winter; while another, his next neighbor, does not strike a furrow; and yet both may be right, for both may have been taught by experience that his system is the better one of the two. But were they to exchange estates, they would, too probably, each carry his practice along with him, because his action had been the result of habit rather than of investigation; and so they would proceed until, after some years of costly experiment, each would find that, in changing his land he should have changed habits also. The truth is, that whether land should be ploughed up in autumn and exposed for the melioration to the winter's frost, or whether left undisturbed under whatever coating it may be wearing, depends on various circumstances, and especially on the natural texture and composition of the soil. These circumstances are so well explained in the following Essay, that we have concluded to preserve it in the Journal of Agriculture. The reader will find in it, also, observations that cannot be too well remembered, in reprobation of one of the grossest blunders that a Farmer can commit—that of *ploughing his land when wet.* We have long been so well satisfied, from personal observation as well as by the common-sense view of the case, of the very pernicious effect of stirring land when wet, not only on the succeeding crop, but on the land itself—effects from which it sometimes does not entirely recover for years—that we take the first occasion, in a sense of duty, to impress it upon the reader, by the following forcible remarks on it in connexion with winter ploughing. The rationale, in both cases, is here made apparent:

HOW TO AFFORD THE NECESSARY SUPPLY OF AIR TO THE ROOTS OF PLANTS.—BY MR. J. MAINE, BROMPTON.

The breaking up, or turning the surface of cultivated land, either by the plough, spade, or hoe, for the reception of seeds or plants, is a process so universally practised and indispensable for the well-being of the crops intended to be raised thereon, that it may be deemed incredible that such a common and simple affair should not be universally understood. And yet it cannot be denied that many and frequent mistakes are committed in this matter, and these must proceed either from indolence or ignorance.

As the surface of the earth is the natural station for the generality of plants, and where they obtained the necessary elemental food requisite for their development and maturation, certain conditions of the said surface are absolutely necessary. Humidity, heat, and air, in due proportions, are indispensable, both to the fibrous roots which are extended in the earth and to the head which is expanded in the air. There is more danger, however, from an excess of moisture than from the extremes of either heat or air; because, when the soil is saturated with water, the access of the genial air and its gaseous properties is excluded, and the delicate fibres, imprisoned and choked, it may be said for want of breath, must, in such a case, necessarily languish. That a porous soil is requisite for the free growth of every plant is an axiom in cultivation, and on this axiom all our operations of ploughing, trenching, digging, &c., are founded; and, that no excess of water should at any time remain to chill, sodden, and consolidate the staple, draining in all its branches and modifications is had recourse to.

Soils are various in quality, and particularly in texture and consistency. The success of crops appears to depend as much on the texture of the land as upon any other property. For, where air and rain can permeate freely, a constant supply of both aqueous and gaseous nourishment is afforded, independently altogether of the richness of the soil, whether natural or artificial. While on the other hand, if the soil be compact, baked hard by drouth, in consequence of its having been previously labored or stirred when too wet, no plant can possibly flourish. The conclusion, therefore, is, that the soil for any kind of crop shoul never be impervious to air from being saturated with water, nor impervious to both air and water from its dry adhesiveness.

Sandy soils, upon a gravelly or chalky subsoil, are never liable to be drenched with water but only for a very short time after heavy rain, or sudden thaw when snow is on the ground. All the water absorbed by such a soil sinks deep into the subsoil, and far below the roots of corn or any agricultural plant on the surface. Such a soil needs neither draining nor subsoil ploughing. Neither does it ever require to be exposed to the frosts of winter, or any kind of treatment by implements to produce amelioration. It is almost always in such an open friable state that it may be ploughed and sown at any season, without risk of being ploughed and harrowed into the condition of mud, or of being poached into the state of mortar by the horses' feet.

In some countries there are large tracts of such land, and on these farmers are generally fortunate men. The culture is easy, and executed at a moderate expense. The crops of turnips are heavy ; and if, besides the ordinary supplies of dung and tail-dress, the farmers can manage to give their fields a liberal coat of marl or reducible clay every eighth or tenth year, the heart and fertility of the staple is maintained unimpaired for ages.

In such descriptions of land, however, it often happens that beds of clay lie alternately with those of sand at different depths beneath the surface. These beds of clay, if the general surface of the farm or field lies sloping, crop out at different distances below each other and above each the surface staple will be either occasionally or constantly wet. If a pasture, rushes will appear accompanied by the worst grasses, and herbage produced that will certainly rot sheep, especially if introduced from drier pasturage. If the land be arable, the crops raised thereon will be unequaled; on the wet places, the corn will be either too rank and inferior, or fail altogether. In such cases, efficient under-ground drainage is the remedy to get rid of the superfluous moisture, either by gently-falling diagonal or direct channels. The proper direction of the drains depends on the depth, extent, and inclination of the beds of clay, and it is well to have a professional man to stake them out, unless the tenant has a sufficient knowledge of geology himself. It is surprising to those who know but little of the nature of the various strata of the earth's surface, how easy it is in some cases to get rid of surface water. For instance, if there be wet and dry places on the same field, the owner may be assured that a bed of clay, or other kind of earth impervious to water, lies beneath the wet, and a porous subsoil beneath the dry places. A drain of sufficient depth opened (and filled nearly to the surface with stones or loose gravel) from the wet to the dry places, will certainly render the whole dry. In my own practice, and acting on the principle, I have been in many cases very successful in laying arable fields dry. Two cases I may mention as examples : A field of eleven acres, of a fine loam, suitable for wheat, beans, or indeed any other crop, had a hollow near one of the ends, which was every winter filled with water, and ruinous to wheat or grass, very frequently to the extent of between two and three acres. This I resolved to drain. A neighboring farmer predicted that the attempt would be a failure ; because his father, when tenant, sunk a shaft to the depth of above seventy feet, in the lowest dip of the hollow, and filled it with stones, expecting that this would form a *swallow* for all the rain and melted snow retained by the hollow. But this expectation was not realized ; the water first filled the pit, and then flowed over the land as before. The cause was easily comprehended ; the pit did not reach to the chalk-rock, nor did it pierce through any porous stratum ; its loamy sides and bottom were perfectly water-tight, so that little or none could escape.

My plan was different. I saw marks in an adjacent field of where chalk had been drawn at some former time ; thither I opened a stone-filled drain below the plowshare, from the lowest dip of the hollow ; and, when the water had accumulated, it ran towards the old chalk-pit; but totally disappeared long before arriving at the place, and thus was a valuable field laid dry. Another arable field contained a pond, which very often overflowed its boundaries. Lower ground was at a distance of half-a-mile; and the expense of forming so long a drain prevented all attempts to get rid of the annoyance. I advised the tenant to dig a deep drain from the pond up into a high bank of gravel, into which the water oozed away immediately; and ever after carried off all excess. By this simple expedient a large piece of excellent land was reclaimed and brought into a regular course of culture at a very trifling expense.

It is by such means that land, naturally friable and loose in texture, may be relieved of superabundant water, and give admittance to the necessary supplies of air at all times. I have already observed that sandy soils require no exposure for the purpose of reducing adhesiveness either by the action of frost or machinery; and yet we often see such land carefully fallowed up in the autumn, and even laid in ridges, to receive the advantages supposed to be imparted to it by the contact of frosty air. That such an idea, namely, that arable land is benefitted by exposure to frosty air, has been long entertained, is evident from what has been written on the subject by old authors. Even our amiable poet, Thomson, in one of the flights of his pregnant imagination, says—

> "The frost-concocted glebe
> Draws in abundant vegetable soul,
> And gathers vigor for the coming year."—*Winter.*

Showing that the notion was held by philosophers as well as cultivators; and, at the present time, there are many among the latter who mistake the disrupting, ameliorating effects of frost on tenacious soils for its enriching property, which they imagine is communicated to all soils. But this is a mistake; the less light sandy soils are exposed to the sun and air, the less are they exhausted of their humid riches. Their best qualities are as liable to be washed away by winter rains as dissipated by the summer sun; and therefore, they cannot be too close and level during winter if it is intended that they should be cropped in the spring.

I have often noticed the mismanagement of a field of light soil by the following culture:—It was fallowed, cleaned, dunged, ploughed, and sown with tankard turnips about the middle of June. The crop was abundant, and a flock of full-mouthed wethers was put on in the end of September. Within a month, the turnips were eaten off, and the field was ploughed into single 'bout ridges to lie for the winter. In April, the ridges were ploughed and harrowed down, and barley and seeds were sown. Both rose well; but throughout the summer growth, the ridges were as visible in the crop as they were after the plough, the centres of the ridges bearing the finest and strongest plants of the crop. And the reason was obvious; the centres of the ridges came up fresh, moist, and mellow, while the intervals were filled with the bleached dry crests of the ridges, which, though more pulverised, were much less fertile and stimulating than the fresher portions of the surface. Hence it was quite evident that, if the whole field had been permitted to lie undisturbed till the spring the crop would have risen more equally and much more vigorously. I have seen fields of similar soil sown with oats after wheat—a bad custom certainly, and as badly executed—the wheat-stubble being ploughed in October, and the oats sown and harrowed in February, whereas, had the wheat-stubble been only scuffled off and harrowed to bring up a crop of seed weeds, and so rested till February or March, and then ploughed and sown, the crop of oats would have been much more abundant both in straw and corn than by the former method.

Here it is necessary to observe that, as I set out with showing how absolutely necessary an open porous soil is to all vegetation, and no measures being recommended in the above statements for that purpose, but rather the contrary, it is to be remembered that I have been treating of sandy land, which is at all times, except when too wet, sufficiently porous for the reception of air. But in other descriptions of soil, such as that whose particles are minute and have a tendency to adhere closely together, either by gravitating subsidence or by a flow of rain water—in such a case, every practicable means must be taken to alter and break this solidifying nature of the staple, in order to admit a free range of air and the gases it contains.

There are many intermediate descriptions of soil between sand and clay, and all of these, according as they approach to the one extreme or the other, require a peculiar management. But the grand object is to work the soil in such a manner that it shall always be pervious to air, rain, and all atmospheric influences. And this result is obtained by the *timely* application of the implements rather than by the efficiency of the implements themselves. The soil is sometimes in a fit state to be worked, and very often is not. Under such circumstances the judgment of the cultivator must be exercised. The condition of the land depends very much on the season and character of the weather; and on this account seed-time cannot always be commenced at the times which would be most convenient to the farmer. In such a case, he must wait until the land is in right order to be stirred; and that state is, when it is neither too wet nor too dry. I am alluding to land which has either been thoroughly drained or which needs no draining, and is only affected by the season, whether very wet or very dry. But as the exact time cannot always be hit upon, it is better that the arable surface be rather too dry than too wet when moved. Because, if too dry, it may be reduced to the necessary fineness by labor, and will then be in the best possible state for the reception of seeds; the interstices between the particles of the soil being filled with air, amid which the imbedded seeds germinate in the greatest vigor. But if the soil be too wet when moved, and especially by the pressing or pushing action of the plough, it acquires, from the excess of water, a state of fluidity like mortar, and settles down again so compactly, that no seed laid therein can be developed in a healthy condition, in consequence of the want of air.

That the contact of air to the roots of plants was always considered necessary, is evident from old writings; but the fact has never been so generally noticed and acted upon as it is now. The first and most striking instance confirmatory of the opinion was the fact of large full-grown ornamental forest trees having been killed by their roots being too deeply covered up with earth when levelling lawns; and planters and gardeners have been long aware of the injurious effects of planting as well as sowing too deep. The same individuals formerly fancied that their prepared composts, for exotic or favorite flowering plants, could not be too finely sifted for their reception, whether in pots, or in the open ground. But slovenly or careless management in these particulars showed that too much nicety of execution was not at all necessary. Sifting the composts was given up, and composts made up chiefly of nodules of turf, broken stone, brick rubbish, &c. are substituted with evident success; and the cause is obvious—when the compost is sifted, it becomes a solid mass, especially after it is watered, and repulsive of all atmospheric influences, whereas among the loose materials, a considerable body of air reposes, and in this the more active fibres extend themselves much more luxuriantly than they do in compact soil.

The gardener's improved practice is only another proof how much a porous soil and presence of air are necessary to the roots of plants; and yet we often see the most luxuriant vegetation produced by soils which are apparently very close in texture; viz. alluvial soils and fertile clays. Both these descriptions of soil being composed of the finest atoms, become exceedingly close and compact if undisturbed; but when ploughed, or otherwise moved periodically, the stirred portion attracts as much of the qualities of the air as suffices for the following crop. It is rather remarkable that, while oak thrives best on a clayey subsoil, it does not seem to affect rich alluvial land; and this I imagine to be entirely owing to its closeness of texture preventing all access of air to the place of the roots.

Aquatic plants which live entirely submerged, although defended from external air, receive as much as they need from the surrounding water, which always contains a notable measure, besides nutritive bodies in solution, which form the pabulum of plants, whether aquatic or terrestrial.

Another tribe of plants are attached to earth, but so slightly, that their system of roots is nothing compared with the bulky heads sustained; and as these plants are mostly found on rocks, or on the driest tracts of country, it is evident that the greatest portion of their nutriment is drawn from the atmosphere. Another tribe of curious and beautiful flowering plants is called Epiphytes; [or parasitical plants, as the Misletoe;] because they attach themselves to the stems and branches of trees, not to sustain themselves by extracting their juices, but to be supported in the deep shade and most air of thick tropical weeds. Some of these are called *air plants*, and grow as well in a basket without earth, suspended in a warm, damp, shady place, as if they were in their native habitat.

Thus we see that air is particularly necessary to plants, and as much so to the roots as to the head and foliage; and it is this fact, as already observed, that justifies all the means of cultivation which we have recourse to with a view of rendering the staple more loose, and consequently more permeable to all atmospheric influences.

There is one circumstance, however, which deserves to be noticed along with these general remarks: it is this—that all seeds require to be closely embedded in the soil, that is, they should be in close contact with the mould all round; and, that this should be completely secured, some seed require to be laid in *heavy*, as wheat for instance. Now we have only to consider that as the soil has been previously prepared, and more or less reduced to the finest practicable state, a considerable volume of air is incorporated therewith, and that this air, according to its temperature and the moisture of the soil, facilitates the germination of the seed, and continues to assist the development of the plant. To obtain this close embedding of the seed, it is the practice to tread it in—a practice which is found of service to wheat, peas, beans, and almost all small seeds; but which would be of no avail without the previous disruption and aeration of the soil.

All these matters premised, it only remains to conclude with a general declaration that, in all our practices and means employed for the amelioration of the land, every thing that can be added or taken away, every operation performed, and every implement used in the culture, should all have for their ultimate object either directly or indirectly, the breaking up of the compact and impervious surface, so that copious and constant supplies of air may be freely admitted to the roots of the plants.

ON THE ROTATION OF CROPS.

It has been observed by Lord Kames, "that no branch of husbandry requires more sagacity and skill than a proper rotation of crops, so as to keep the ground always in heart, and yet to draw from it the greatest possible profit." Indeed, no one, who understands the subject, can doubt that it is one of the very last importance; and so prominent a place does it hold in the art of agriculture, that no better criterion can be found on which to estimate the merits of a farmer, than in the course of cropping which he has adopted.

More stress has been laid upon a systematic succession of crops than seems requisite. The great art of cultivation consists in the maintenance of the land at least in sound condition, and without impoverishing it, if it cannot be enriched; and it is essentially necessary that the amount of labor, as well as the quality of manure employed upon the ground, should be duly apportioned to its quality.

The main object of all rotations should therefore be to establish such a *series of crops* as, by preventing the too frequent recurrence of any one of those which are considered exhausting, shall guard against the dissipation or loss of those component parts or qualities of the soil, which seem peculiarly adapted to the growth of each, and in the abundance of which consists its fertility.

A judicious rotation of cropping for every soil, requires a degree of judgment in the farmer, which can only be gathered from observation and experience. The old rotations were calculated to exhaust the soil, and to render it unproductive. To take wheat, barley, and oats in succession, a practice very common not many years ago, was sufficient to impoverish the best land, while it put little into the pockets of the farmer. But the modern rotations are founded on principles which insure a full return from the soil, without lessening its value or deteriorating its condition. Much depends, however, on the manner in which the different processes are executed; for the best arranged rotation may be of no avail, if the processes belonging to it are imperfectly and unseasonably executed.

A good system of cropping is, in my opinion, says the jusly celebrated Chaptal, the best guarantee of success that the farmer can have; without this, all is vague, uncertain, and hazardous. In order to establish this good system of cropping, a degree of knowledge is necessary, which unhappily is wanting to the greater part of our practical farmers. I shall here state certain facts and principles, which may serve as guides in this important branch of agriculture.

The proper distribution of crops, and a plan for their succession, are one of the first subjects to which a farmer should direct his attention. The kind of crops to be raised is determined, in a great measure, by the climate, soil and demand; and the quantity of each by the value, demand, and the adjustment of farm labor; the great art of the latter being the division of it as equally as possible throughout the year.

The system of rotation is adapted for every soil, though no particular rotation can be given for any one soil which will answer in all cases, as something depends on climate, and on the kind of produce in greatest request. But wherever the system of rotation is followed, and the several processes of labor which belongs to it properly executed, land will rarely get into a foul and exhausted state. The particular crops which enter into a system of rotation, must obviously be such as are suited to the soil and climate, and other local circumstances; such as the proximity of towns and villages, where there is a greater demand for turnips, sugar beets, ruta-baga, mangle-wurtzel, cabbage, potatoes, hay, &c., than in a thinly peopled district.

In general, beans, and clover, with rye grass, are interposed between grain crops, on clayey soils; and turnips, the whole family of beets, potatoes, clover and rye grass, on dry loams, or sands. A variety of other plants, such as peas, cabbage, and carrots, occupy a part, though commonly but a small part, of that division of a farm which is allotted to green crops. This order of succession, is called the system of *alternate husbandry;* and on rich soils, or such as have access to abundance of putrescent manure, it is certainly the most productive of all others, both in food for man and for the inferior animals.

One half of a farm is, in this course, always under some of the different species of *cereal gramina*, and the other half under roots, cultivated herbage, or plain fallow. But the greater part of arable land cannot be maintained in a fertile state under this management; and sandy soils, even though highly manured, soon become too incohesive under a course of constant tillage. It therefore becomes necessary to leave that division which carries cultivated herbage, to be pastured for two years, or more, according to the degree of its consistency and fertility; and all the fields of a farm are treated thus in their turn, if they require it. This is called the system of *convertible husbandry*, a regular change being constantly going on from aration to pasturage, and *vice versa*.

The principles upon which a *regular succession of crops is founded*, are thus laid down by Yvart and Pictet of France, and are given in full in "Chaptal's Chemistry, as applied to agriculture," from which work we make our extracts.

Principle 1.—*All plants exhaust the soil.* [Plants are supported by the earth, the juices with which this is impregnated forming their principal aliment. Water serves as the vehicle for conveying these juices into the organs, or presenting them to the suckers of the roots by which they are absorbed; thus the progress of vegetation tends constantly to impoverish the soil, and if the nutritive juices in it be not renewed, it will at length become perfectly barren. A soil well furnished with manure may support several successive crops, but each one will be inferior to the preceding, till the earth is completely exhausted.]

Principle 2.—*That all plants do not exhaust the soil equally.* Plants are nourished by air, water, and the juices contained in the soil; but the different kinds of plants do not require the same kinds of nourishment in equal degrees. There are some that require to have their roots constantly in water; others are best suited with dry soils; and there are those again, that prosper only in the best and most richly manured land.

The principal part of the nourishment of the grain crops, and the greater part of the grasses which push up long stalks, in which the fibrous principle predominates, is derived from the ground by their roots, so that these plants exhaust the soil without sensibly repairing the loss.

Those plants on the contrary, that are provided with large, fleshy, porous, green leaves, imbibe from the atmosphere carbonic acid and water, and receive from the earth the other substances by which they are nourished. If these are cut green, the loss of juices, which the soil has sustained by their growth is less sensibly felt, as a part of it is compensated for by their roots. Nearly all the plants that are cultivated for fodder are of this kind.

Leguminous plants, such as clover, lucerne, beans, peas, &c., exhaust the soil less than grains. Their perpendicular roots divide the soil, and their large leaves, and thick, loose, porous stalks, readily absorb air and water. Plants that are cut green, or while in flower, exhaust the soil but little.

Principle 3.—*That plants of different kinds do not exhaust the soil in the same manner.* The roots of plants of the same genus or family, grow in the soil in the same manner; they penetrate to a similar depth, and extend to corresponding distances; and exhaust all that portion of the soil with which they come in contact. Plants exhaust only that portion of the soil which comes in contact with their roots; and a spindle root may be able to draw an abundance of nourishment from land, the surface of which has been exhausted by short or creeping roots.

Principle 4.—*That all plants do not restore to the soil the quantity, or the same quality of manure.* The plants that grow upon a soil, exhaust more or less of its nutritive juices, but all return to it some remains, to repair part of its loss. The grains and the oleaginous seeds may be placed at the head of those which exhaust the soil the most, and repair the least injury done it. In those countries where plants are plucked up, they return nothing to the soil that has nourished them. Many plants that are not allowed to produce seed, exhaust the soil but very little; these are very valuable in forming a system of successive crops, as by introducing them into the rotation, ground may be made to yield for many years without the application of fresh manure; the varieties of trefoil, especially clover and sainfoin, are of this sort.

PRINCIPLE 5.—*That all plants are not equally favorable to the growth of weeds.* It is said that a plant fouls the soil, when it facilitates or permits the growth of weeds, which exhaust the earth, weary the plant, appropriate to themselves a part of its nourishment, and hasten its decay. All plants not provided with an extensive system of large and vigorous leaves, calculated to cover the ground, foul the soil. The grains from their slender stalks rising into the air, and their long narrow leaves, easily admit into their intervals those weeds that grow upon the surface, which being defended from heat and winds grow by favor of the grain they injure.

From the principles here laid down, says our author, we may draw the following conclusions: *First.* That however well prepared a soil may be, it cannot nourish a long succession of crops without becoming exhausted. *Second.* Each harvest impoverishes the soil to a certain extent, depending upon the degrees of nourishment which it restores to the earth. *Third.* The cultivation of spindle roots ought to succeed that of running and superficial roots. *Fourth.* It is necessary to avoid returning too soon to the cultivation of the same, or analogous kinds of vegetables, in the same soil.* *Fifth.* It is very unwise to allow two kinds of plants, which admit of the too ready growth of weeds among them, to be raised in succession. *Sixth.* Those plants that derive their principal support from the soil should not be sown, excepting when the soil is sufficiently provided with manure. *Seventh.* When the soil exhibits symptoms of exhaustion from successive harvests, the cultivation of those plants that restore most to the soil, must be resorted to.

These principles are confirmed by experience; they form the basis of a system of agriculture, rich in its products, but more rich in its economy, by the diminution of the usual quantity of labor and manure. All cultivators ought to be governed by them, but their application must be modified by the nature of soils and climates, and the particular wants of each locality.

To prescribe a series of successive and various harvests, without paying any regard to the difference of soils, would be to commit a great error, and to condemn the system of cropping in the eyes of those agriculturists who are too little enlightened to think of introducing into their grounds the requisite changes. Clover and sainfoin are placed amongst the vegetables that ought to enter into the system of cropping, but these plants require a deep and not too compact a soil, in order that their roots may fix themselves firmly. Flax, hemp, and corn require a good soil, and can be admitted as a crop only upon those lands that are fertile and well prepared.

Light and dry soils cannot bear the same kinds of crop as those that are compact and moist. Each kind of soil, then, requires a particular system of crops, and each farmer ought to establish his own upon a perfect knowledge of the character and properties of the land he cultivates. As in each locality the soil presents shades of difference, more or less marked, according to the exposure, composition, depth of the soil, &c., the proprietor ought so to vary his crops, as to give to each portion of the land the plants for which it is best adapted; and thus establish a particular rotation of crops.

An intelligent farmer, whose lands lie at a distance from a market, will endeavor to avoid the expenses incident to the transportation of his products; and in order to do this he will give the preference to those harvests of fodder or of roots which may be consumed upon the place by his dependents and his animals.

There is another circumstance which must be attended to in sowing those lands which are light, or which lie upon a slope; for these it is necessary to employ such vegetables as cover the soil with their numerous leaves, and unite it in every direction by their roots, thus preserving it from being washed away by rains, and at the same time protecting it from being too much dried by the burning rays of the sun.

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* In addition to the reasons I have given why plants of the same or analogous kinds should not be cultivated in succession upon the same soil, there is another which I will here assign. M. OLIVER, Member of the French Institute, has described with much care all the insects which devour the neck of the roots of grain; these multiply infinitely if the same or analogous kinds of plants be presented to the soil for several successive years; but perish for want of food whenever plants not suited to be food for their larvæ, are made to succeed the grains. These insects belong to the family of Tipulæ, or that of flies. (Sixteenth Vol. of the Memoirs of the Royal and Central Agricultural Society of Paris.)

In order to support by example the truth of the principles which I have here laid down, I will make a statement of the series of crops that are found most advantageous in those countries where agriculture is the most flourishing. I shall commence with the province of ancient Flanders, because there the art of cultivating the soil to the greatest advantage had its birth. In the departments of Lille and Douai, where the soil is of the best kind, and the art of preparing and employing manures is carried to the greatest perfection, the following series of crops are adopted.

FIRST SERIES. Flax or cabbage—wheat—beans—oats with trefoil—trefoil—wheat.

SECOND SERIES. Turnips—oats or barley with trefoil—trefoil—wheat.

THIRD SERIES. Potatoes—wheat—roots, such as the sugar beet, ruta-baga, turnips—wheat—buckwheat—beans—oats and trefoil—trefoil—wheat. [The other references are so similar that we omit them.]

In this rotation of crops we find that after the soil has been manured, the crops that are most exhausting are replaced by those that are less so; and those that foul the soil, by those that cleanse it by requiring frequent weedings. It is by similar means that nearly the whole sea coast of Belgium, consisting of sterile sand, has been rendered as fertile as the best soil; and the richest harvests have followed from a judicious system of cropping.

This is the *foreign system* of rotation, recommended by that great man, Sir ARTHUR YOUNG, more recently by CHAPTAL and other eminent agriculturists. By it the industrious inhabitants of many parts of Great Britain and the continent of Europe, have vanquished all obstacles, and fertilized a soil to the highest degree which was heretofore sterile, and nearly unproductive.

The *American system* is conducted on very nearly the same general principles; all that is necessary to say therefore on this point, is embraced in the following paragraphs, which we extract from an interesting paper in the Farmers' Cabinet, page 296, vol. ii.

" *System* is as important in farming as any other business; without it, confusion, disorder and loss will be the inevitable result. Fifty years ago there was no regular, rational systematic rotation of farming pursued in what are now the best cultivated districts of Pennsylvania. The consequence was a regular and constant deterioration of the soil, producing less and less annually, till starvation and want seemed to be inevitable, in many sections of country, that are now in a very high state of cultivation. The introduction of red clover, and plaster of paris, with a judicious rotation of crops, gave rise to the astonishing improvements which have taken place within forty or fifty years. The soil gradually became enriched and regenerated under the improved system, and its increased products enabled its owners still further to add to its fertility; and how far this plan of progressive improvement is capable of being carried, has never yet, that I have ascertained, been determined; but many of us have lived to see farms, that yielded but a very scanty support to a single family, under the old way of cultivation, now not only support in affluence, three, four, or five families, but furnish the means of enriching them all, by the adoption of the modern improvements in agriculture.

" The following rotation is generally adopted by the leading and most successful farmers in the best cultivated parts of eastern Pennsylvania. After a grass or clover field has been mowed one year, and the next succeeding year been used for pasture, it is broken up or ploughed, either late in the autumn or early in the following spring, and planted with Indian corn, which is cut off in the fall and the field ploughed as before, either in the fall or following spring, and sowed with oats or barley; and immediately after the harvesting of the oats or barley, the ground is ploughed, manured and sown with wheat.

"*Grass seed* should be sowed on the wheat early in the spring, and if timothy is intended to accompany the clover, it had better be sowed in the fall, and the clover, orchard grass, or herd grass seed sowed early in the spring; and be sure not to be too sparing of the grass seed, for much loss is often sustained by not putting it on thick enough, particularly as the clover in some soils is often injured by the winter frosts, and then it is important to have plenty of timothy, orchard grass, or herd grass roots to supply its place.

"The spring following the wheat crop, plaster of paris should be applied, say one bushel to the acre; most of our best farmers consider this to produce as great an effect as any larger quantity. This season cut the grass for hay, and the next succeeding season pasture the grass, and in the autumn it may be again ploughed for corn the following season, and proceed with the same round of crops again in the same order; but if the farm should contain a sufficient number of fields, and the grass be well set, it may be pastured a second year before it is broken up for corn. The first is a five years rotation, the latter six.

"The best time for applying lime or marl in this rotation of crops, is believed to be in the fall, after the wheat crop; applied as a top-dressing on the young grass or clover. In this mode of application, its effects are very conspicuous in the increased quantity of grass the first season, and when the sward is broken up for corn, the effect of the lime or marl, on that crop, will be much greater than if they were applied to it the same season."

CULTIVATION OF CEREAL GRASSES.

THERE are a great variety of plants raised for their seeds, and known as *cereal grasses*. Those most usually grown in this country, to which our climate is friendly, are *wheat*, *rye*, *oats*, and to some considerable extent, *barley*. To these we must add *maize*, (INDIAN CORN,) which in many sections is raised in immense quantities, being regarded by the majority of our farmers, probably, as the most important crop they can raise. To this we must add *buckwheat* and *rice*, which are very important crops, the latter not only feeding thousands in this country, but forming one of our principal articles of export.[*]

Seed of every kind should attain full maturity ere it be sown.—There is always risk in employing that which has not arrived at perfection, although instances may occur in which such seed has produced sound crops, when favored by soil and season.

There is a particular *period at which each species of seed ought*

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[*] The term *corn* is applied indiscriminately in Europe to all grains furnishing food for the human race. Our *maize*, or Indian corn, cannot be successfully raised in England, on account of the humidity of the climate preventing its coming to perfection; and its culture has not, as a field crop, been attended with success in Europe, except in the southern parts, along the Mediterranean in Spain, the countries of the Levant, &c.

to be sown, in order to bring the plants to a perfect state of ripeness. This, however, depends so much upon the soil and season, that it cannot be fixed by any general rule; and the farmer can only be governed by the state of the weather and the forwardness of his work; for, whatever may be his experience, his judgment may be deceived in the choice of time.

The condition of the land is, in fact, the best guide; for if it be in a mellow state, between drought and moisture, the seed may be put in with confidence. Some kinds, however, prefer a dry and warm soil; others, that which is more humid and tenacious. Thus, barley, rye, and buckwheat, succeed best on the former; and wheat and oats on the latter. It has, indeed, been remarked, that a certain state of the atmosphere, with which all farmers are well acquainted, is favorable to sowing.

The *depth at which seed should be sown,* is a matter of nicety, as well as of importance. If too deeply buried, germination is impeded, and may be altogether prevented; while, if sown too shallow, sufficient moisture is not left in the surface to afford nourishment to the roots of the plant.

The depth at which seed ought to be placed, must, therefore, be regulated by the nature of the soil. If stiff, more moderate covering should be used than if light and porous; wheat, barley and oats, also require more than rye or buckwheat; but except in a few instances, from one and a half to three inches, is in every case, the lowest to which it should be carried.

WHEAT.

Of the several species cultivated, greatly the most important in rural economy is the winter wheat. The kinds of it are very numerous, and, in truth, there is scarce a limit to the differences which climate, soil, and situation may produce.

The characters which it thus acquires in the different conditions in which it is placed, are more or less permanent and important. The kinds are distinguished by a great variety of local terms, derived from their respective qualities, their places of growth, and other circumstances.

Wheat is of very general cultivation on all classes of soils; but the soils best suited to it, are those which are more or less clayey. So peculiarly is wheat suited to the stiffer soils, that they are familiarly termed wheat-soils. The soils of the lighter class are the least suited to wheat; and it is an error in practice to force the production of wheat on soils, and under circumstances, which are better suited to the production of the other grains.

Good wheat land, ought, therefore, always to possess a certain degree of consistence; for, although light soils, composed chiefly of sand and gravel, will often produce wheat of good quality, yet rich heavy loams and strong clays, with a proper portion of sand, always yield that which is the weightiest in the bushel, and the most productive in the crop.

If, along with a small quantity of sand, it have about fifteen per cent. of lime, it may be classed among soils of the best quality for the production of this crop, provided it also contains a sufficient portion of nutritive *humus*, or mould. Soils of this description are generally of a dark brown color, and work freely, in consequence of the mixture of lime, which prevents them from being too adhesive.

A general rule, applicable to all cases in which wheat is sown is, that the land shall be in the best condition that circumstances allow, with respect to tillage, cleanness and fertility. As wheat is the most valuable of the cereal grasses, so it requires greater care than the others to produce it. It is an error in practice, to sow with a grain crop, any land which is out of order; but this error is greater and more hurtful in the case of wheat than of almost any other grain crop.

As the wheat crop generally receives no further culture after it is committed to the earth, the soil intended for its reception should be brought into as fine condition as possible. To accomplish this, manuring and thorough culture are indispensable; if this is attended to, the soil will be in a loose, mellow and fertile state, and possessing such a depth of tilth as will have a tendency to preserve it in good condition.

Most crops require high manuring and a rich soil, and it is scarcely possible to carry this to excess, especially in the case of corn; but with wheat the case is otherwise. Land, naturally very rich or very highly manured, is apt to cause, during the hot season of summer, a too rapid growth of straw, at the expense of the seed; and rust, lodging, and ultimate failure, is frequently the consequence.

It is an established law in vegetable economy, that an extraordinary growth of the stem and leaves is always at the expense of the fruit or seed. Hence, fruit trees very rarely bear while in a very thrifty state; but require first to be checked in their growth, in order to produce fruit.

Now, as it is during the heat of summer, a season when vegetation advances most rapidly, that wheat matures its seed, it is more liable, on this account, to suffer from too vigorous a growth, than other plants which ripen their seed later in the season, such as Indian corn.

In modern tillage, wheat more generally follows clover than any other crops; years of practice having confirmed the opinion entertained by many intelligent farmers, that clover is the best preparative for a crop of wheat. The practice is as follows: The clover field having been mowed or fed off, is generally turned up the *second* year of its having been laid down to grass. In this case, all "farmers who *work it right*, give but one ploughing, and harrow in the seed by passing the harrow twice in a place the same way with the furrows."

If the clover sod is completely subverted by the furrow slice being turned *flat*, whereby all the vegetable matter is completely shut in, or buried, the sward thus turned in, will begin to decompose, according to the favorable state of the weather and other circumstances, in from ten to fifteen days. This, by many, is considered as the proper time for putting in the wheat.

This process is what is called sowing or putting in wheat *upon a clover ley*, and is considered as one of the great improvements in modern agriculture. It has been adopted for years past in New England, with great advantage. Even in the middle States, in pursuance with this practice, together with the use of plaster and lime, the face of the country in many places has been entirely renovated.

Much diversity of opinion prevails even among many intelligent practical farmers, in regard to the proper period for sowing wheat on a clover ley. Some contending that the operations of ploughing, harrowing and seeding should immediately follow each other: Mr. Bordley, in his valuable work on Husbandry, advocates this system. The practice, however, does not generally prevail.

On the other hand, Mr. Macro, an eminent English farmer, says, "from upwards of twenty years' experience, I am of opinion, that the best way of sowing clover lands with wheat, is to plough the land ten or fourteen days before you sow it, that it may have time to get dry, and after rain to make it dress well. I have often tried both ways on the same lands, and always found that ploughing several days before seeding answered best.

Both modes give crops superior to what are produced on a fallow: farmers may therefore try both methods for determining which to prefer; that is, as well *immediate* sowing on ploughing in the clover, as the method of sowing not till ten or fourteen days after having ploughed in the clover—suppose a half each way.

Webb Hall, in his Prize Essay on the growth of wheat, says that the ley sould be broken up at least a month before the seeding of the ground; both that time should be allowed for the decomposition of the sward, and chiefly, that the land may be allowed to settle.

If it be desirable to sow wheat after a fallow crop of peas, barley, rye, oats, &c., the land should be immediately ploughed or thoroughly harrowed after it is cleared, that the scattered grains may have sufficient time to vegetate—then one good ploughing with sufficient harrowing is a good preparation of the seed.

Seed wheat should be selected from the earliest and most perfect growth of the preceding year, and thoroughly cleansed from rye, cockle, imperfectly or shrivelled grains, weeds, extraneous substances, &c. Too much attention cannot be bestowed on this part of the operation, if you wish to harvest a clean crop, as every kind of seed will produce its like. Too much care cannot be observed in the selection of seed.

It has been satisfactorily ascertained by repeated experiments of distinguished agriculturists, that steeping seed wheat about twelve hours in weak ley, lime, or common lime water, will prevent smut, and destroy the larvæ of insects, and the germ of smut and other diseases to which it is subject. If immediately rolled in plaster, or a mixture of lime and plaster, the crops will be sufficiently increased to pay three times the expense.

This process should never be omitted, because, besides detecting the shrunk and shrivelled grains, and many seeds of other plants, which will float on the surface of the water, it entirely removes the dust of smut and rust, and thus prevents their propagation. This practice is fully sustained by the experience of eminent English farmers.

A practice of steeping, very general in England, and to some extent practiced in the United States, is thus described by Professor Low. Let a tub be provided, and partly field with urine, and let a quantity of wheat, as a bushel, be put in at a time. Let the wheat be well stirred, and all the lighter grains which come to the top, be skimmed carefully off, and thrown aside as useless. The wheat should remain from five to ten minutes, but never more than ten minutes, in the pickle.

The successive portions of wheat thus pickled, are to be allowed to drain a little, and then to be laid upon the barn-floor in layers, hot lime being at the same time sifted upon each layer. The purpose of spreading the lime is to dry the grain, which should then be carried immediately to the fields and sown.

The Professor does not mention the quantity of lime. Half a peck must be amply sufficient for a bushel of wheat, and it should be carefully stirred, that every grain may receive a portion. Quick-lime fresh from the kiln, which has been recently slaked with some of the liquor used for the steep, is to be preferred. Great caution is requisite in the use of lime—for if not properly slaked, so great a degree of heat might be raised as to destroy its vegetative power.

A very strong pickle of salt dissolved in water may be used instead of urine; but salt-brine is not quite so secure a means of destroying the infection of the disease as urine. That of urine ought to be preferred as being the most efficient; but it should be neither too *fresh* nor too *stale;* for it is ineffectual in one case, and injurious in the other. Its strength also differs according to the nature of the food from which it is extracted; and is more powerful when produced by human beings than by animals. There are many other steeps known to our farmers, some of which are valuable and much used.

We will here repeat, that we wish every grain grower to bear constantly in mind, that wheat, after being pickled, must not remain long unsown, otherwise its vegetative powers may be injured or destroyed. No more should be pickled at a time than can be then sown. When, from any cause, as from rain intervening, it is not practicable to sow the wheat for a day or two, it should be spread thinly upon the floor, but never kept in sacks, in which it would soon ferment.

The wheat, when pickled, then, is to be carried directly to the field. It may be sown either by the hand or the broadcast sowing-machine, or in rows by the drill machine.

To guard against worms and grubs in the soil, a mixture of slacked lime and ashes, at the rate of from three to eight bushels to the acre, harrowed in at the time of sowing, is the best preventive, and will act at the same time as a valuable manure, if the land has been previously exhausted by too frequent cropping.

The most experienced farmers prefer a *change of seed* to that grown by themselves. In order that they may be enabled to judge correctly of the sample by which they purchase, it should be retained a minute or two in the closed hand, and then pass gently through it to ascertain if the grain be plump, hard, dry, and smooth, with a certain sense of mellow fulness in the feel; for, if it handles rough, and does not slip readily through the fingers, it will be found thick skinned, damp, and unprofitable to the miller.

The time of sowing winter wheat must depend upon the state of the land as well as the season, and it is not always in the farmer's power to choose the moment which he would prefer; for if the wheat be sown after another crop, that crop must first be removed; and even if it be sown upon a fallow, the operations of a late harvest, or the state of the weather, may interfere.

The best period of sowing wheat, it has been said, is from about the middle to the end of September. The early part of October, however, is well suited to the sowing of wheat, and it may be continued until the middle of November. Such is the great diversity of climate and soil in this country, together with the changes of weather and other circumstances, that it is impossible to designate a fixed period, or lay down any general rule—but, on the whole, early sowing is to be recommended.

In regard to the *time*, there is a difference of opinion; many give a preference to early, others to the late sowing. By early sowing, the roots of the grain have sufficient time to establish themselves before the frosts of winter set in. It has also been ascertained that grain sown early, will throw up a greater number of lateral stems and branches than that which is sown late. We have also the authority of Mr. Nicholson, author of the Farmer's Assistant, for stating, that late sowing requires one-third more grain to the acre, than if put in early. Early sown, a bushel is sufficient; late, a bushel and a half to the acre, and sometimes more, may be necessary.

Grain for seed should be selected from the cleanest and most thrifty parts of the field; a constant attention to this, will cause a permanent improvement in the kind. By gathering single heads, remarkable for their early maturity, size, &c., and propagating from them, improved varieties may be gradually obtained.

The quantity of seed per acre, varies according to circumstances. It should vary with the time of sowing, and with the size of the grain. Late, requires more than early sowing; and large and full seed should be in a greater quantity than that which is small, in order to compensate for the less number contained in a bushel. Much, therefore, must be left to the direction of the farmer, who must take into consideration the time of sowing, the quality and preparation of the soil, as well as the plumpness or the shrivelled state of the seed wheat.

The proper time for sowing, must not, in any case, be neglected; an error of a few days on this point, will not unfrequently diminish, but in some instances prove ruinous to the crop. But as a large crop cannot be sowed in a few days, it is better to sow a fortnight too early, than a week too late.

Wheat, and all the cerælia, have the common property of sending out numerous shoots from the roots during their growth. This natural process is termed *tillering*, and is familiar to all farmers.

It is to be observed, too, that often the roots of the grasses are partially raised above ground, in which case the plant becomes feeble or perishes. This accident sometimes occurs from too thick sowing, and too rapid growth in that state. But it is more frequently produced by the sudden contraction and expansion of the soil by alternate frosts and thaws in winter; and in this case, the wheat is said to be thrown out.

To promote the process of tillering, and sometimes to prevent the throwing out of the plants, it is found to be beneficial to give a certain tillage to the growing wheat in spring, by means of the hoe, the harrow, or the roller. When wheat is sown in rows, this is done by the hoe; when broad-cast, by means of the harrow; and in either case, the roller may be also used.

But this tillage is given to it incidentally, and in the course of another operation to be described, the sowing of the seeds of clovers and the cultivated grasses; a system very prevalent in the grain regions of Europe, and to some considerable extent known to American practice. Like all other systems, it has its advocates and opponents; but so far as we are able to judge from experience and the testimony of others, the mass of evidence is decidedly favorable to the practice.

The seeds of these plants are sown as early as the state of the weather and other circumstances will justify, in the spring, upon the surface of land on which the grain crops have been previously sown. They grow up under the shade of the latter, and in the following season they are fit for use.

When the crops of grain with which they are to be sown are sown in spring, they are generally put in the ground together. But when the crop, as of wheat, has been sown in the previous autumn, the grass seeds are sown among the growing plants, and covered by being harrowed or rolled.

The minute seeds of these plants, consisting of the clovers and rye-grass, and other grasses, are, previously to being sown, carefully mixed together, sown by the hand, or what is better, by the broad-cast sowing machine. In either case, the harrow follows, giving a double turn along the ridges; and the roller may also follow, crossing the ridges, and going over the ground once. In some cases the roller alone is used to cover the seeds.

The clovers and grasses thus sown, rarely flower in the first year. They grow under shelter of the stems of the larger crops, and they are seen in the autumn among the stubble, covering the surface. They continue to grow, shoot vigorously forth in the spring, and are in their greatest luxuriance in the following summer, when they are frequently termed new or one year's old grass.

Tde grass seeds being sown, no further culture can be given to the wheat during its growth, nor any weeding, except pulling up or cutting over above ground the larger weeds, such as docks, thistles, cockle, and the like.

Wheat sometimes becomes too luxuriant in the spring, especially when sown early, and then it is apt to be lodged, and run to straw more than to produce grain. In this case it may be pastured in the early part of spring with sheep.

The produce of this crop varies greatly with the seasons, the nature of the soil, the character of the seed, and the mode of cultivation. A fair good crop may be held to be thirty bushels per acre; but the average produce of the United States, will not, probably, exceed twenty bushels per acre. The weight of the straw is reckoned to be about double that of the grain. An acre, therefore, yielding twenty-five bushels of grain, at the rate of sixty pounds per bushel, would yield about three thousand pounds of straw.

DISEASE OF WHEAT.—Wheat is subject to various *accidents* and *diseases*, some of them peculiar to itself. The most dreaded and destructive of the diseases to which it is liable, is *blight*, so termed from its effects upon the ear, or *mildew* from its supposed cause, namely, *mel-dew*, from an old opinion that it was produced by honey-dew falling from the air.

In many of the wheat growing sections of the Union, these diseases are denominated *rust* and *smut;* under the term rust, blight and mildew are included. But these diseases, if they are really distinct, are nevertheless so nearly allied, that for all practical purposes they may be considered as one.

The remedies against rust, mildew or blight, as laid down in the "Code of Agriculture," by Sir JOHN SINCLAIR, are as follows: Cultivating hardy sorts of wheat—early sowing—raising of early varieties—thick sowing—frequent changes of seed—consolidating the soil—using saline manures—improving the course of crops—extirpating all plants that are receptacles of rust, and by protecting the ears and roots of wheat by rye and other crops.

In the present state of botanical knowledge, as regards the diseases of grain, it is out of our power to offer any remedy for injuries arising from such various and uncertain causes. But as they seem to be chiefly occasioned by a close state of the atmosphere, they may, probably, be partially guarded against, by preserving as free a circulation as possible of air among the plants, by keeping the fences as low as the security of the crop will permit; and especially by drilling the grain instead of sowing it broadcast.

Smut is a disease almost peculiar to the grain of wheat. It differs from rust and mildew in this, that the means of prevention are generally within our power. The remedies are numerous, and such as are calculated to destroy any noxious quality adhering to the seed grain, be it the seeds of minute parasitic plants or of animalculæ.

An European farmer, after repeated experiments, gives it as his opinion that the best preventive is to steep the seed in strong lime water, which, it is presumed, destroys the vitality of the seed of the smut. It is a general opinion, in this country, founded on experience, that the steeping and liming of seed wheat, is a certain remedy against smut.

The use of fresh burnt lime is almost indispensable; as lime, exposed for any length of time to the action of the atmosphere, will, in a great measure, lose its causticity. By absorbing carbonic acid it is restored to the state of limestone or chalk, and its alkaline qualities are completely neutralized.

One of the most eminent of American agriculturists, whose opinion on these matters is always received as good authority, says, that he is surprised to learn that smut its still permitted to adulterate and diminish our grain crops, when it is a fact amply and satisfactorily established, that steeping the seed grain twelve hours in brine, and rolling it in fresh slaked lime, before sowing, will prevent the evil.

The *pepper-brand* and *dust-brand*, the two species of smut, are parasitic plants, the minute seeds of which attach to the grain, and are propelled through the sap vessels of the plant to the germs of the young grain. The salt and lime destroy the vitality of these seeds.

Of all the injuries to which wheat is liable, there are perhaps none which are more to be dreaded than those arising from *insects* and *worms*, which invariably commit great devastation, and in some seasons spread their ravages to a very alarming extent.

Of these, the various tribes of predatory insects, those known under the names of wheat-fly, Hessian-fly—or weevil, or any of their numerous varieties, are the most dangerous; and although treated of by naturalists, they have furnished no means of either a radical prevention or cure. The wheat-fly generally makes its appearance about the middle of June, and its operations, it is asserted by some, cover a period of from thirty-seven to thirty-nine days.

A late American work on Agriculture, says, that the hessian-fly deposits its eggs in the winter wheat, in which state it remains until the plant has acquired some growth; the grub then feeds upon it, and the plant, having its nourishment intercepted, sickens.

" In the spring it assumes the perfect form, as soon as the weather is moderately warm, and immediately proceeds to deposit its eggs in the wheat. Wheat grown on highly cultivated land is not generally much injured by this fly.

No individual, probably, has done more to investigate this subject, and find a remedy for the evil, than James Worth, Esq., of Newton, Bucks county, Pennsylvania. The Memoirs of the Pennsylvania Society of Agriculture, for the year 1823, contain several communications, giving in detail the results of his indefatigable and valuable researches.

He recommends a change in the course of crops as the most effectual remedy, viz: break up for wheat, follow with corn, and then oats and grass seed, *ploughing and harrowing the stubble immediately after harvest*, and a SECOND TIME BEFORE MAY, by which means great numbers of insects will be destroyed in the pupa state.

The best remedies seem to consist of a good tilth—a rich but not wet soil—late sowing—ploughing in the stubble immediately after harvest—and perhaps feeding off the crop in the spring with sheep.

There is a case cited in the Memoirs of the Board of Agriculture of New York, in which two bushels of lime were sown upon an acre of wheat infested by the fly, while there was a heavy dew upon the ground. Two adjoining acres, same quality of ground, on which wheat, of the same kind, was sowed at the same time, were not treated with lime. The result was, that the limed wheat gave a good crop, the other not half of an average crop.

Samuel Tallant, of Canterbury, New Hampshire, states, that on the first of July, 1838, a few flies, known as the weevil or grain worm, was discovered on his grain. He examined them from day to day, and found that they increased with such rapidity as to threaten obstruction to his crop. He scattered, by way of experiment, a bushel of slaked lime on about half an acre of the wheat, while it was wet with dew.

The ensuing morning he visited this piece of wheat, and after a careful examination, he found but a solitary fly or worm among it, while in all the other parts of the field, he found the fly had vastly increased in number. He commenced immediately liming the whole field, but his lime falling short, and the case being one admitting of no delay, he had recourse to ashes, which he bountifully applied. The worm or fly disappeared immediately, and the field gave a very fair crop of good sound wheat.

MAIZE, OR INDIAN CORN.

The maize is not only one of the most noble looking of the cereal grasses, but it is one of the most valuable, second to wheat only; and indeed in many places, taking even the precedence of wheat itself.*

Indian corn has a wide range of temperature. In America it flourishes from about the 40° of *southern* to beyond the 45° of *northern* latitude. It is extensively produced in Africa, Asia, and the south of Europe. On all the shores of the Mediterranean—Spain, Italy, and the countries of the Levant—it supplies the food in most common use. The Edinburg Quarterly Journal, says, that of all the cerealia, indeed, it is that which, next to the rice, supplies food to the greatest number of the human race.

Corn, either in whole or in part, is used for bread by one-half if not by two-thirds of the inhabitants of the United States. In the south the climate is unfavorable to the preservation of wheat and flour: hence corn is of necessity a principal article of subsistence with them; while in New England, mixed with rye, it is preferred to any thing else for bread.

The cultivation of corn must then be an object of primary importance with every farmer; and the best methods which experience or theory suggest to increase the quantity and value of the crop, should be attended to by every one engaged in its production.

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* It is generally ranked as the third grain in point of utility, by European writers, they placing it before rice and wheat; but in the United States *it takes the precedence of all other grains.—Essay on Indian Corn by* Peter A. Browne, Esq.

Wheat does not grow on the plains under the equator; it flourishes only in regions that are temperate; while corn delights in the brightest summer sun, and never suffers from the most intense heat, if its roots can only be supplied with moisture. It requires a good soil—one is rarely if ever found too rich, either naturally or artificially. It bears manure better than any vegetable known among us—requires deep ploughing, and sends out its roots to a very great distance and depth.

For this reason, in a rotation of crops, corn generally forms the first of the series, being, like some of the cultivated roots, a gross feeder, and unlike some of the other grains, the magnitude and plumpness of the ear, usually correspond with the size and vigor of the plants produced. Corn land must be made mellow, and if free from weeds and grass, so much the better for both the corn and the cultivator.

Soil. Corn requires a rich, loose and friable soil; and unlike those distinguished for wheat. Yet corn and wheat not unfrequently grow well on the same ground; but there are soils which are excellent for wheat on which corn cannot be grown to advantage. On stiff clayey soils, it is never wise or safe to undertake the culture of corn.

In general, the best soils for corn are such as contain in their composition a large proportion of sand. A light sandy loam is highly esteemed. It has been said that corn requires a rich soil—of course it should receive plentiful supplies of manure. It may be planted after almost any other crop. Wheat stubble, or an oat or rye stubble, is a good preparation for corn; but there is no preparation more suitable for it than a greensward; and if the soil has become old and stiff, that circumstance, of itself, is no serious objection to it.

Preparation. As the practice of planting corn on greensward, has become very general, and is considered as a highly important improvement in husbandry, a few remarks, in reference to the manner or mode of preparing the ground for the crop, adopted by many of our most intelligent and successful farmers, may not be deemed out of place.

The author of "Letters from a Father," who ranks among the first farmers of the Union for his practical knowledge of agriculture, has tried this method for years past with manifest benefit. He says, "a few days before the planting season arrives, the greensward, having had a plentiful supply of dung spread upon it, should be turned over, and the work performed in a masterly manner.[*] I say *masterly manner*, meaning to use the phrase emphatically. What I mean is, that the work should be performed in a very careful and skilful manner.

"Every particle of the sod should be broken up and turned over in furrows, dropping either flat down, or inclining a little one upon another.* Frequently, while the plough is performing this work, it will be profitable to have a hand follow, whose business it should be to rectify places in which the work is imperfectly performed. Such should be the tillage of greensward when corn is to be planted upon it.

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[*] We would recommend in addition to a liberal application of unfermented manure, a light covering of lime to promote the decomposition of the tap and lateral roots of the grass The lime, if but five bushels, should be applied before the manure; the result will, in almost every instance, be highly advantageous. Some cultivators prefer manuring the sward in the fall, ploughing it in, and after harrowing, let it remain until spring.—*Wiggins.*

"But why speak of such tillage as though it were applicable to corn ground alone? In no other manner should greensward ever be broken up, whatever may be the immediate use for which it is intended. If farmers, when they commence their summer fallows, would plough in the manner now suggested, instead of cutting and covering and leaving the clods in all positions, as many of them do, their gains would be very great."

After the plough comes the *roller*. It is by no means a matter of indifference whether the ground be or be not rolled. The roller is of great use in settling down the turf, and thus placing it in a situation the more readily to rot, and administer nutriment to the crop. The roller as well as the harrow, should be drawn only in the direction of the furrows, *not* across them. But if the use of the roller is forbidden by the presence of too many stumps or stones, then the tillage must be completed as well as it can be by the harrow only. But it must be remembered that rolling in no case supersedes the use of the harrow.

The last implement employed in the tillage of the ground, preparatory to planting, is the *harrow*. It should not be used sparingly, but carried over the ground until the entire face or surface of the inverted sward is completely broken up and thoroughly pulverized. The full benefit of the harrow in such cases, is rarely realised, as it is seldom used as much as it should be. After the sward has been thus prepared, it should in no case whatever be subsequently operated on, or stirred up so deeply as to disturb the sod. In subsequent tillage, the cultivator may be used to great advantage—the operations of whatever kind should be superficial.

Manure. "Unfermented stable and yard manure is decidedly preferable if spread broadcast, as it always should be, and thoroughly buried with the plough. It keeps the soil open, and permeable to heat, air and moisture, the agents of nutrition; it imparts warmth to the soil while undergoing the process of fermentation, and affords the best food for the crop."

Edward Tatnall, of Brandywine, Delaware, has furnished the public with some interesting statements relative to his method of growing corn. He says, speaking of the manure, "it is best to combine the lime and manure by applying both to the same crop. That is, in preparing for a crop of corn, I should put on about twenty-five ox-cart loads of barn-yard manure to the acre, spread it evenly, and plough *late* in the fall, harrowing it well before winter sets it.

"In the spring I spread on sixty bushels of lime to the acre, again harrowing until the ground is in good order for planting." It is then struck out lightly, in which operation, as well as in the after culture, the greatest care is taken not to disturb either the sward or the manure.

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* We cannot agree with the writer in the propriety of the furrows "inclining a little one upon another." There is no danger in laying the furrow too flat. It is certainly the best way.—*Wiggins.*

By this process the land is left in good order for the following crop; and we learn from Mr. Tantall, that he has raised from sixty to seventy bushels of corn per acre the first year, and from twenty-five to thirty bushels of wheat following the corn crop; and that, too, from land that would not previously produce oats worth cutting. Several farmers of our acquaintance have adopted Mr. T.'s plan, successfully, so far as the corn is concerned—and no doubt is entertained of the value of subsequent crops.

Selection of seed. The *Dutton corn*, so called, is the earliest for field culture that we are acquainted with, and most suitable for the middle states. It may be planted in this latitude, 40°, the latter part of May, and even as late as the first of June, and cut off the first week in September fully ripe. It is a hard corn, deeply yellow, grains set very close, generally twelve rows, sometimes more, but never eight. It is remarkably heavy, and is considered more sweet and nutritious than the ordinary kinds of corn usually raised in this country. The stalk is small, it shades the ground less than other kinds, and of course admits of being planted much nearer together. Many of our farmers, however, still prefer the old varieties of gourd seed.

The Canada or Northern corn is cultivated extensively in some parts; while in the southern and south-western states the *Baden corn* is in high repute, and has taken the precedence of almost every other kind. It is very prolific, stalk large and vigorous, and requiring a long season to come to maturity. It appears to be peculiarly adapted to the south; and although it has been raised in the middle and northern states, and in many localities would be highly desirable on account of its great yield, and the vast amount of fodder it affords, yet our liability to early and severe frosts forbid its general cultivation.

Preparation of the seed. The following is Judge Buel's practice in preparing the seed for planting: "We turn upon the seed, the evening before planting, water nearly in a boiling state. This thoroughly saturates the seed, induces an incipient germination, and cause the corn to sprout quick. The next morning we take half a pint of tar, for half a bushel of seed, put into an iron vessel with water, and heat it until the tar is dissolved and the liquid becomes tar water. It is then turned upon the seed and well stirred. It adheres to the grain and gives it a thin transparent coating.

The tar serves a double purpose—it prevents an excess of moisture entering and rotting the seed if the weather or soil are cold or wet; and it preserves it from depredations of birds, (and some insects,) &c., which prey upon it. After the seed is taken from the steep, where we never leave it more than fifteen hours, as much ground gypsum is mixed with it as will adhere to the kernels. The gypsum prevents the kernels adhering to each other, and favours the after growth of the crop." Ashes of lime may be substituted for gypsum. The seed should be planted while it is moist, and immediately covered. It should not be long exposed to the sun.

Distance of planting. The varieties of seed and the richness of the soil must determine the distance at which the corn should be planted. If the distances are too great, there is a needless waste in the use of land; if too small, the corn will be choked and rendered less productive. When it is considered that good varieties and proper distances are attended with no additional expense or labor, its importance must be manifest. The northern varieties of corn are much better adapted to the culture of the middle states than the southern varieties already referred to, though the latter are very productive.

The Dutton, and other northern varieties, being much smaller in the stalk, require less room than the southern, and, consequently, a much larger number of hills or rows may be planted on an acre; and in the same proportion is the crop increased. The most approved method now adopted of planting corn, is in *rows*, or drills, generally running north and south; the respective distances between the drills, and the seeds deposited in the drills, must vary according to circumstances.

It has been stated, and that correctly, that nearly all the large premium crops of corn, which have been noted in the annals of agriculture, were produced by planting the corn in drills, either single, double, or treble. A difference, however, exists relative to planting it in ridges, or on a flat surface; this must, in a great measure, depend upon the nature of the soil; as a loamy soil, or one suitable for corn, ought in this climate to be cultivated in a flat way, in order that it may the better retain moisture.

Quantity of seed and covering. "From using too little seed, and a recklessness in covering it, many corn fields are deficient one half of what ought to grow upon them." From six to eight kernels are to be dropped in a hill, and very carefully covered with finely pulverized mould. If any hard clod or substance is placed on the hill, the plants will probably be retarded in their growth. Care must be taken that the seed be not buried too deep, as it may not germinate—if too shallow, it may suffer for lack of moisture. The extra expense for additional seed and labor is nothing, compared to the increase of the crop. Two inches is a sufficient covering, if the earth is so compressed as to retain its moisture.

The after culture. As to the after culture of the corn crop, it is almost impossible to prescribe any thing like a rule of universal application. The great object is to extirpate weeds, and to keep the *surface* mellow and open, that the heat, air, and moisture may exert the better their kind influences upon the vegetable matter in the soil, and converting it into nutriment for the crop. The cultivator may be advantageously passed between the rows of corn three or four times, though ordinarily but two dressings are given to the crop. This practice is to be governed altogether by the state of the soil and season.

The plants are thinned at the first dressing, which is usually performed with the hand-hoe—the surface pulverized, and the plants reduced to from three to four in a hill. It is well to gather, at this operation, a little fresh earth into and around the hill. A somewhat similar process is observed by many in the second dressing. The earthing must not exceed one inch and a half, that the hill be broad and flat, and that the earth for this purpose be not taken from one place, but gathered from the surface between the rows, where it has been loosened by the cultivator.

Harvesting. The crop should be cut up at the ground as soon as the grain is glazed, or as soon as it will do to top, and, without being laid on the ground, set immediately in stooks. There are four substantial reasons for adopting this mode of harvesting. It secures the crop from the destructive effects of frost; it quadruples the value of the fodder: it clears the ground early for a fall crop, and it saves labor in harvesting; and we may add a fifth, it makes a better crop of grain, under any contingency, than when it is topped in the old way. We are confident of this last fact. The grain continues to profit by the elaborated sap in the cut stalks, while it does not profit by the unelaborated sap, below the ear, in the topped corn.

Husking and cribbing. The ears should be gathered from the stalks, and the latter stacked, as soon as they have become sufficiently dry and cured, as unnecessary exposure to the weather is prejudicial to both the grain and the forage. From two to three weeks generally suffices to effect these objects. The corn may be picked off and carried to the barn, and it should be husked within twenty four or thirty six hours thereafter, and before the least heat is perceptible in the pile, and the stalks bound and placed in small stacks, so as to expose all the butts, which have become saturated with moisture by standing on the ground, to the drying influence of the sun and winds—and the stacks topped, or covered with straw, so as to shed rain. After a fortnight or so, they may be carried, in a dry state, to the barn. When picking the corn from the stalks, the best seed ears should be selected, and immediately braided, and hung in an airy loft. The corn should be exposed, after being husked, upon the barn floor, to the drying influence of the winds, and it may require to be turned over and stirred, till the *cob* is thoroughly dried. If this is wet, when cribbed, fermentation may ensue, or a frost may follow, sufficient to congeal the moisture in the cob, either of which will impair the quality of the grain, and destroy its germinating principle.

In storing the corn we make three parcels, viz. sound grain for the crib, pig corn, embracing the ripened but defective ears, and the truly soft and smutty ears, which are not husked, but thrown by for immediate use. The silk and husks are carefully separated from the two first parcels, as they imbibe moisture, induce mouldiness, and afford building materials for mice. We also separate the grainless tips and stems of that which we place in cribs, for the like reasons, and to preserve the grain in a sound bright condition.

The forage from the corn crop, when saved in the manner we have directed, is an excellent fodder for neat cattle, if cut for feeding out. We have used it in this way, exclusive of hay, for two years, and find it answers all the purposes of hay. Our practice is to cut a quantity, to mix with it bran, or roots, cut up, when we have them, and to sprinkle the mass with brine, and to feed in mangers.

The Gennessee Farmer, vol. vi., contains an article of great interest to corn growers, presenting, in a condensed form, a history of the various methods adopted by farmers in different sections of the United States to produce those large crops, which go so far to show that the capabilities of our soil, and the most beneficial and advantageous course of treatment, are but imperfectly understood.

"Too many concurring favorable circumstances are, perhaps, required to often realize the highest hopes of corn, on record. If the best and most thorough modes of preparation and culture were adopted, yields of from eighty to a hundred bushels, might, in favorable seasons, be relied on with certainty." Indeed it is not uncommon, in many parts of our own state, (Pennsylvania,) to witness a yield of from seventy-five and eighty, to a hundred bushels of corn upon an acre, without any extraordinary application of manure, or unusual attention to the culture—certainly not more than all crops should receive. These results were, of course, in seasons favorable to the growth of corn. E. P******E, of Delaware county, has averaged from ninety to one hundred bushels per acre, for several years in succession; and he informed the writer of this, that in the year 1838, a season of drought, his corn turned out ninety-seven bushels per acre—this he attributed mainly to the fact of his keeping the earth well stirred during the prevalence of the drought.

Mr. GAYLORD, in the article referred to above, in which he proceeds to show the method adopted to produce large crops, says: The first I shall give, is from a report of a crop by Mr. BUGBEE, near Springfield, Massachusetts. He says, "Last spring I ploughed up a piece of greeensward, measuring five acres. After ploughing, thirty loads of manure to the acre were spread over it, and thoroughly mixed with the earth by the harrow, without disturbing or breaking the sward. On the 30th of May I planted my corn. A small quantity of ashes, lime and plaster, mixed together and prepared for the purpose, was put into the hill at the time of planting. Of this mixture there were two and a half bushels of lime, the same of plaster, and twenty-five bushels of ashes for the whole five acres." The corn was hoed twice, and from one acre, the crop being carefully gathered and measured, it was found to be one hundred and eight bushels of good clean merchantable corn. As this acre was no more than a fair average, the quantity produced by the five acres was not less than five hundred and forty bushels. How much in this case is to be attributed to the mixture applied to the hill is of course unknown, but the theory of the application is good, and deserves a repetition.

In 1831, Mr. Butler, of Chenango county, New York, reported for the New England Farmer a crop of corn raised by him that year, and the method of cultivation. The ground was a stiff loam. The land ploughed but once, yet thoroughly and completely done. Twenty-five cart loads of sheep manure was then put on an acre, and spread evenly over the surface. It was then rolled and harrowed with a light double harrow containing forty teeth, until it was a complete garden mould. The land was planted on the 22nd and 23d of May, on an even surface, with the early, small white flint corn, steeped in a solution of copperas and saltpetre, and then tarred and rolled in plaster, and planted three and a half feet from centre to centre of the middle of the drills. The plants stood singly from twelve to thirteen inches on the drills. The corn was kept clean, plastered well on the plant, topped at the usual time, was ripe on the 15th of September, and was harvested the middle of October, and found to yield "at least one hundred and thirty bushels of shelled corn, sixty pounds to the bushel, or one hundred and forty bushels, at fifty-six pounds per bushel, to the acre."

But the greatest crop of corn, we have reason to believe, ever raised in this country, was that reported by the Messrs. Pratts of Madison county, and which was well authenticated in every respect, amounted to one hundred and seventy bushels per acre. Their mode of preparation for planting does not appear to be superior to those mentioned above, but they increased their crop by adopting a system of planting which gave a greater number of stalks and of course ears.

It is admitted that these are extraordinary cases of productiveness; but the ordinary crops of Mr. Stimson of Galways, and Judge Buel, of Albany, averaging as they do from eighty to one hundred bushels per acre, clearly demonstrate what may be accomplished by sound theory and corresponding practice. We think that farmers in general are not sufficiently aware how much the amount of the crop depends on the method of planting. This is an operation which more than most others requires attention and system; for let the soil be ever so rich and productive, if there is not half the seed put on which the land can support, or if it is not properly distributed, there will of course be a deficiency in the crop. To show how much greater the number of stalks will be in one method than in another, we have prepared an estimate, collected in part from an address by Judge Buel, and the statement of Mr. Clark of Northampton. In a favorable soil it rarely happens that every original stalk does not produce one ear, and sometimes two, of corn; allowing these ears to produce in shelled corn one gill each, and they must be very inferior not to exceed that quantity, the amount produced per acre by different methods of planting, will be as follows, four stalks being allowed to each hill when planted in that form.

An acre in hills four feet apart, and four stalks in a hill, will have two thousand seven hundred and twenty two hills, or ten thousand eight hundred and eighty-eight stalks. An acre planted three feet apart will have four thousand eight hundred and forty hills, or nineteen thousand three hundred and sixty stalks. An acre planted three by two and a half feet will have five thousand eight hundred and eight hills, or twenty three thousand two hundred and thirty-two stalks. An acre planted in drills at three feet, and the plants in the rows at six inches distance, would have twenty-nine thousand and forty stalks. An acre planted in double drills,

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six inches apart, the plants nine inches in the rows, and three feet nine inches from the centre of the drills, would have thirty thousand nine hundred and seventy stalks. An acre planted three rows in a drill, thus,

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rows six inches apart, and the plants nine inches in the rows, with a distance of three feet from the centre of the drills—and this was the way adopted by the Messrs. Pratts to produce their great crop—would have forty-three thousand five hundred and sixty stalks. Reduced to a tabular form, and a gill of corn to a stalk allowed, and the result would be thus:

Rows 4 feet by 4,	10,888 stalks,	42 bushels,	fractions omitted.
" 3 " 3,	19,360 "	75 "	"
" 3 " 2½,	23,232 "	93 "	"
Drills 3 feet, plants 6 inches,	29,040 "	113 "	"
Double drills as above,	30,970 "	120 "	"
Triple drills as above,	43,560 "	170 "	"

The difference is indeed most striking, yet how few there are that will profit by such lessons. We continue to plant our corn so as to get only from forty-five to fifty bushels an acre, when the same soil is able to give us eighty or a hundred. But we satisfy ourselves with the reflection, that our fathers were as wise as most men, and they always planted their corn in hills, and why should we deviate from such a practice. The best corn we have ever raised, or seen raised, was planted in rows two and a half feet apart, and the corn eighteen inches in the rows, two stalks standing together, being the same as if planted in hills at three by two and a half feet.

There can be no possible doubt of another thing in planting, and that is, our farmers are far too economical of their seed corn. Better to use double the seed actually required, than to have your land but half supplied with plants. There is an advantage too in being able to select the most vigorous plants at hoeing, while the weak and sickly ones, not being needed to stock the field, can at once be rejected. Judge Buel has estimated the expense of raising a crop of corn at fifteen dollars per acre, allowing five dollars for rent of land. Now if a farmer gets, allowing the corn worth fifty cents per bushel, sixty bushels, he makes fifteen dollars an acre; if but twenty bushels, he loses five dollars; making a difference in the profits of twenty dollars between twenty and sixty bushels an acre, or one hundred dollars on a piece of five acres. Corn, when properly cultivated, is a most valuable crop, and it ought, moreover, to be remembered, that the extra manuring and tilling required to produce a heavy crop of corn, is abundantly repaid in the increased quantities of wheat, barley, or grass that may follow. Twenty acres of good land is better than fifty of poor; and a man will be much more likely to get forty bushels of wheat, or fifty of barley, from land that has produced a hundred bushels of corn to the acre, than from that which will not produce one-fifth that amount. It is contrary to the order of nature, that manure and labor applied to the earth should be lost.

THE TURNIP.—ENGLISH TURNIP AND RUTA-BAGA.

"It would have been perhaps more consistent with due order in the arrangement of a work on husbandry, to have commenced with the cultivation of turnips—as the foundation of an alternate system of tillage—rather than with the growth of grain; and had we undertaken to direct the practical management of any one farm, we should have adopted that plan."*

It should, however, be borne in mind, that although we furnish the best details with which we are acquainted, regarding the culture of crops, yet we only profess to treat of them *separately;* leaving the reader to judge for himself of the best course of cropping, according to the peculiar nature of his land.

The turnip is said to be a native of the sea-coast of the north of Europe, where they are found growing spontaneously. There are several species, and numerous varieties of the turnip; but those which specially require our attention, are—1. The common turnip. 2. The Swedish turnip, or RUTA-BAGA. The turnip culture was introduced into England about two centuries since, by Secretary TOWNSEND. It was bitterly opposed by the British farmers; but he faultered not in the good work, but persevered and lived to witness a complete revolution, and the almost universal culture of the despised turnip, throughout the kingdom. The ruta-baga is of recent introduction.

Turnips and clover are now the two main pillars of British husbandry. They have contributed more to augment and increase the fertility of the soil for producing grain—to enlarge and improve the breeds of cattle and sheep—and to afford a regular supply of butchers' meat throughout the year, than all other crops combined.

The soil, preparation of the ground, mode of culture, and general management of the common turnip and the ruta-baga, are in all respects similar. They both require a very finely pulverized soil, which is accomplished only by repeated ploughings and harrowings, as hereafter described. In all cases where the crop is intended to be followed by wheat, the land should be well manured previously to the first ploughing.

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* Farmer's Series, Library of Useful Knowledge, p. 231.

Soils. The soils suited to this crop are of the lighter kind; they are grown on all comparatively dry soils, including the loams, and under almost all the variations of climate. Their cultivation on cold and tenacious clays cannot be recommended. The more preferable soils are those which grow good Indian corn.

Preparation of the soil. With us, though there are many exceptions, turnips are generally a *second* crop. The land is ploughed with a deep furrow immediately after harvest, usually in the direction of the former ridges, that if the soil be dry, it is of little consequence in what direction. All the weed-roots, &c., brought to the surface, are carefully gathered into heaps, and either burnt on the ground, or carried off to form a compost, usually with lime. The land is generally ploughed and harrowed again, if considered necessary, and all the weeds brought to the surface are removed as before. Loose stones, and all obstacles to good tillage, are to be removed.

If the drill culture is intended the land is again ploughed, harrowed and rolled, and any weeds disengaged are collected and taken off. It is then generally well pulverized, and in a fit condition to be formed into drills. If this should be so, the same operation of ploughing, harrowing, and gathering of weeds is to be repeated, until the ground is cleared of injurious roots, and reduced to a pliable state.* The drills are then formed. The distance vary from twenty-seven to thirty-six inches—thirty inches is a good distance. The intervals should be wide enough to admit of after culture by the cultivator.

Manuring. Different kinds of manure, as well as various modes of application, are used. Some spread the manure evenly over the land, before ploughing; others deposit it in the intervals or drills. Of well prepared barn-yard or compost manure, a liberal supply is necessary, as the goodness of the crop will depend upon the fertility communicated to the soil. The manures suitable to the turnip are applicable to all the other root crops. Lime, street-sweepings, sea-weed, bone-dust, plaster, ashes, &c., are all used in the drill system. These are sown in the drills.

Sowing. The old plan of sowing broadcast is now nearly abandoned and the drill barrow, which is an admirable instrument, is almost universally used in the sowing of root crops. The advantages arising from the use of this implement are, the seeding is performed expeditiously and with great regularity. The land being prepared, as previously described, the machine lays out the drills, drops the seed in the fresh earth, covers and rolls it down immediately, by which means the seed will generally germinate several days earlier than when planted in the old way.

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* The writer is fully aware that this process will be objected to as too expensive, troublesome and laborious. But all is abundantly made up in the increase of the crop, and more especially in the fine state of improvement in which it leaves the soil.

The *time of sowing* varies according to circumstances, season and climate. From the middle to the last of July is the usual time; some sow as late as the 12th of August. When sown broadcast, a quart of seed is sufficient for an acre; and when sown in this manner, the field may be passed over by the harrow as soon as the turnips have attained the size of walnuts. Though many of the plants will be displaced, the crop will be vastly benefitted by the operation. When sown by the drill machine a pint of seed is abundant. It is generally considered that late sown turnips are much the best for the table, and that they are less liable to disease and the ravages of insects, if sown late, than when sown early in the season.

After culture. In the after culture of the turnip, as well as all other root crops, the cultivator cannot be dispensed with. It is, as soon as the young plants show themselves above ground, to be passed along the intervals, pulverizing the earth, and removing the weeds. At the second operation a hand follows with the turnip-hoe, the drills are to be well cleansed and the plants thinned; the proper distance between the plants is eight to twelve inches. The distance between the plants, it should be remembered, must be regulated according to the strength of the land, the time of sowing, and the kind cultivated —strong ground and early sowing, always producing the largest roots. The width of the hoe should be in proportion to the medium distance to be left between the plants; and the distance should be according to their expected size. Sometimes the cultivator passes again along the intervals, but more frequently the hand-hoeing, just referred to, concludes the process; the weeds being now kept down by the rapid growth of the plants, and the overshadowing of the intervals by the leaves.

Harvesting is postponed as long as the season will permit. The roots are pulled by hands, laid on the ground, the tops of the two rows facing each other. A hand following with a bill-hook, with a light blow separates the tops from the roots as rapidly as three or four persons can pull them. Three men will, in this way, harvest, of a good crop, three hundred bushels per day. The tops are gathered into heaps and taken to the barn-yard in carts daily for the stock, until they are consumed.

There are various methods adopted of *storing turnips.* The Genesee Farmer recommends pits to be dug in the field where they are raised, limited to two feet in width, of an indefinite length, and not more than two feet deep. But it is all-important that the soil and sub-soil of the place where the pit is sunk, be light and dry. They may be buried in almost any soil, peculiarly adapted to their culture. The turnips are stored by hand, and require great care, and should terminate in a ridge about eighteen inches above the ground.

The crown of the ridge is then to be pierced with an iron bar, at intervals of about a yard, into which a wisp of straw may be inserted, so as to let off the rarified air; otherwise the roots will heat, and the rarified air not being permitted to escape, the turnips are apt to rot. For want of this precaution many crops have been nearly lost.

No danger need be feared from the admission of frost to the roots through these openings. The best way is to store them in barns, or in cellars. They must always be guarded against frost.

Yield. The amount of produce per acre varies according to the soil, good or bad tillage, and other circumstances. Six hundred bushels of the common or English turnip are generally considered as a good crop—but heavier crops are frequently raised. The Farmers' Cabinet gives, on the best authority, eight hundred and fifty-two bushels to the acre. The ruta-baga, with proper care, yields large crops—on an average, and with the same treatment, one-third more than the common turnip. Numerous instances are on record of from twelve to sixteen hundred bushels being raised to the acre; these cases have received special attention in the after culture as well as in the preparation of the ground; the drills were about two feet apart. Since the general introduction of the ruta-baga, the cultivation of the common turnip, as a field crop for the use of cattle, has declined. But no good farmer will give up entirely the culture of one for the other, as a change is not only agreeable but beneficial to cattle and sheep.

Use. We all know their value as a table vegetable. The tops serve as food for cattle in autumn; and in winter they are fed to cattle. They are cut by an implement with four blades into as many pieces—other implements are also used. They are excellent for sheep, especially for ewes that have young. They are very excellent for fattening stock. Judge Buel says, "a bullock will thrive fast upon two bushels a day, and will consume hardly any hay, and requires no drink."

Obtaining varieties. The turnip is sometimes cultivated for its seeds for sowing, and by careful selection varieties of the plant may not only be multiplied, but greatly improved. A manner of procuring a good variety of turnip is to select the largest and best formed turnips, with the smallest tops, and plant them in rows, at a considerable distance from any plants of the same family. They will flower, and when the pods are formed, they are to be guarded against the depredation of birds. When the seeds are matured, the stems are to be cut down and well dried, the seeds separated from the pods, and carefully preserved for future use.

The diseases and accidents to which this plant is subject are very numerous. It is liable to a kind of blight. But its most fatal enemy is the fly. No effectual remedy for either has as yet been discovered. It does not suffer now, however, as much as in years past—and the crops have never been as seriously affected in this country as in England.

The following is a statement from Rev. Henry Colman, one of the first farmers of New England, of his method of raising the ruta-baga or Swedish turnip.

Gentlemen—Accompanying this you have the certificates of a crop of ruta baga raised this year (1830) on my farm in Lynn. From these it will appear that on an acre, measured by a sworn surveyor, on one side of the field, there were gathered seven hundred and forty-one baskets full; and that forty baskets of the above named weighed at the town scales two thousand seven hundred and fifty pounds net weight. This, allowing fifty-six pounds to a bushel, the standard weight assumed by the society, would give a crop of nine hundred and three bushels to the acre.

The turnips were planted on the 29th of June and 2d of July; about one pound and a half of seed was used for the acre; and they were gathered and stored in cellars and in the barn in the last part of November.

The ground on which they grew is a good soil, neither wet nor dry, and bore the last year an abundant crop of onions, and corn the year preceding the last. It was well manured at both times, and in fine tilth. It was manured with at least six cords to the acre of barn manure the last spring, and sowed again to onions; but the seed entirely failing, it was ploughed, harrowed, furrows struck out, and about eight cords of barn manure spread in the furrows; ploughed again so as by a back furrow to form a ridge over the manure, and the seed sown with a small drill-harrow on the ridges, making the rows about twenty inches asunder. As soon as the plants were of sufficient size, a drill-harrow, with small shares fixed to it, to cut off all the weeds, was passed through the rows; and the plants thinned with a small weeding hoe to the distance of about eight inches apart, and the vacant places filled up by transplanting from the supernumerary plants. They were once more harrowed and cleaned, which was a very small labor; and owing to the very unpropitious weather, were not harvested until very late. Some of them were very large; one weighed fifteen pounds, and many were nearly as large. The exact expense of cultivating the acre cannot be estimated, as it was intermixed with other farm work; but the whole, from the sowing to the gathering, was not two-thirds of the labor usually bestowed on planting, cultivating, and gathering an acre of potatoes.

My Swedish turnips the last year, of which I raised considerable quantities, were fed off to my oxen, dry cows, young stock, and fattening sheep. To the cattle they were of very great advantage; and for feeding sheep, they proved the last year, by an accurate account, worth from ten to twelve and a half cents per bushel. The man who has the care of my stock considers them as among the most profitable feed which can be given either to fatting or to store cattle. Three years' experiment has increased their value very much for these purposes in my own estimation.

THE BEET.—THE MANGOLD-WURTZEL—THE SUGAR-BEET.

THE *field-beet*, BETA VULGARIS, is of larger size and grows more above ground than the varieties cultivated in the gardens. It is sometimes red externally and yellowing-white internally; but it has different shades of color. The mangold-wurtzel, or root of scarcity as it was formerly called, is said by Professor VON THAER, to be a mongrel, between the red and the white beet. The mangold-wurtzel and the sugar-beet, as field crops, are of recent date—the latter especially.

The beet, in a good season, sown on a kind soil, and with judicious and careful tillage, will yield an immense crop. The mode of culture throughout, of the mangold-wurtzel and the sugar-beet, is precisely similar. The former is now very extensively cultivated in some sections of England, as a field crop, where they are in high repute for the fattening of cattle and the feeding of milch cows. In the United States they are both in high favor with many farmers, especially the sugar-beet, which contains a large proportion of saccharine matter, and has been found, for all the purposes of its culture, decidedly superior to any of the other root crops.

Chaptal, the best authority perhaps extant, authorized by ten or twelve successive years of experiments and observations on the culture of the beet, recommends it strongly to the notice of his countrymen, not only as a means of supplying the immense empire of France with sugar extracted from the root, but as preparing the way for an improved state of husbandry; not merely by leaving the lands on which the roots are grown, in a most excellent state for succeeding grain crops, but also by enabling the farmer to keep a large amount of cattle in the best order—which in all cases give him a good return —and leaves him in possession of an abundance of manure.

Choice of soils. Distinction in the choice of soils for the culture of this root is exceedingly important. Its nature is to penetrate low into the ground, and, therefore, prefers a deep loose mould in which it can vegetate without obstacle. Its radicles easily collect the nourishment necessary for its support, and it thrives luxuriantly. All grain lands are more or less adapted to the cultivation of beets, but the best soils for the purpose are those that have the greatest depth of vegetable mould.

They may be cultivated with good success upon natural or artificial grass lands, but they come up badly when sown in the spring upon such lands as are broken up in the preceding autumn, the turf and roots do not in so short a time become sufficiently decomposed, and in order to have good beet-roots it is necessary to raise a crop of oats between the time of breaking up a meadow and sowing it with beet-seed, after this two successive crops of the finest beets may be grown. Dry, calcareous and light soils are but little suited to the culture of this root, nor will it flourish well in strong clayey soils.

Situation of the ground. The position of the ground employed for this culture is not a matter of indifference. In high-land the beet succeeds but imperfectly in dry seasons, but it is then easily worked; the crops on these high grounds are abundant in wet seasons. In low marsh grounds the case is reversed, the crop is drowned, and the beet generally saturated with water, whilst in warm dry years the crops are excellent, because the heat and drought are counteracted by the fresh and moist sub-soil. To obtain average crops it is, therefore, prudent when it can be done, to choose a situation exposed to neither of these extremes.

Preparation of the soil. Generally speaking I cultivate beets upon all such lands as are appropriated for sowing grain upon in the fall. The lands I prepare for receiving the seed by three good tillings, two of which are performed in the winter, and one in the spring; (in this country one ploughing in the fall, and two or more, if necessary, in the spring, may be given;) by this last ploughing the dung which is thrown upon the ground after the second is mixed with it, the quantity of manure employed is the same as if the ground was to be immediately sown with wheat. The importance of thorough ploughing, harrowing, rolling, and all other means of improving soils is now pretty well understood. All plants do not require in the same degree precautions, and those which require them *least* generally rank among *exhausting* plants, while those that can least dispense with them are considered *fertilizing*. The beet is of this latter description, and one of the leading advantages which it offers to agriculture is the necessity it creates not only for deep and thorough ploughings, but moreover the careful culture it requires, and the means necessary to gather it, must, in the aggregate, necessarily leave the soil in a highly improved state, and the benefits therefore to rural economy which an extensive culture of this plant must produce are incalculable.

Sowing the seed. The period of sowing the beet will depend in some measure upon the state of the season, the nature of the soil, and the situation of the ground on which the crop is to be raised. Early sowing is strongly recommended by some very judicious cultivators; but the sudden return of frosts in early spring—even after many days of pleasant weather—renders very early sowing somewhat hazardous. In this latitude, 40°, from the middle of April to the middle of May, will probably be found in general the most suitable period. Before planting, pour water moderately warm over the seed, and let it soak one or two days.

It does not answer to sow immediately after the cessation of frosts, as the ground being cold and wet, the seed does not germinate immediately, and the soil becoming hardened by the violence of the rains, does not admit the air to penetrate, so that if the seed do not decay, the beets come up badly. The most favorable period for sowing is that when the earth, although heated by the rays of the sun, still contains sufficient moisture to produce germination and to facilitate the growth of the young plant; the month of April and the early part of May generally unite these advantages.

Choice of seeds. CHAPTAL says that every good farmer always raises his own seeds. In order to do this, he plants his beet-roots, which it is supposed he selects with great care, choosing the finest and most perfectly formed, in the spring, in a good soil, and gathers the seed in September, as fast as it ripens, selecting only the best, and leaving upon the stalks such as are not thoroughly ripe; each beet-root will furnish from five to ten ounces of seeds. When no care is taken in selecting the seeds, and they are sown indiscriminately, not only are many of the beets small and ill-grown, but half of the seeds sown do not yield any thing. The seeds should be fresh, not exceeding two years old, and the utmost care should be taken to know that they are of the true kind.

The seed may be sown in either of the three following methods. 1. In a seed plot. 2. In drills. 3. Broadcast. For field crops, the first and third methods are very objectionable. The true plan is to plant in drills or rows, the land having been previously well prepared; ten to twelve acres may be planted with great regularity in a day, by the use of the drill machine. From three to four pounds of seed are sufficient to plant an acre.

The drills should be from twenty-four to thirty inches from centre to centre; or so wide at least, as to admit the cultivator or horse-hoe in the intervals, which should be used as soon as the plants are fully above ground. The hand-hoers with the turnip-hoe should then follow, remove all the remaining weeds, and at the same time thin out the plants in the rows, to the distance of eight, ten or twelve inches. When the weeds again make their appearance, the cultivator is to be passed between the rows, cutting up the weeds and loosening the earth. The next process, which completes the summer culture of the beet, is the setting up of the earth around the roots.

Harvesting and Preserving the Sugar Beet. The roots are generally gathered in September or October, about the time the largest of the leaves begin to assume a yellowish tinge, and certainly before the setting in of frosts. The remaining leaves may be fed to cattle, having been previously separated from the root, but in such a manner as not to injure its crown. They should not be harvested immediately after long rains. The best, most economical, convenient and effectual mode of preserving the beet, and indeed all other root crops, is in cellars attached to barns, properly constructed and well ventilated; and for this purpose every farmer when about to construct a barn, should fix on a site where, with but little additional expense, he may run off a suit of cellars. The most general mode now adopted for their preservation, is the same as described for the preservation of the turnip. It is, however, both inconvenient and uncertain.

Benjamin Webb, Esq., of Wilmington, Delaware, says, that for the last two years he has cultivated the Silician sugar-beet—yield about eight hundred bushels per acre—the ruta-baga rather more. Expense of raising the sugar-beet, the mangold-wurtzel or ruta-baga, according to his experiments, when compared with corn, as three to one. That is, one acre of roots, properly cultivated, will cost as much as the culture of three acres of corn. The advantage, however, is altogether on the side of the root crop—the produce being ten-fold—producing nine hundred bushels of the ruta-baga to the acre; whereas the same ground would not yield over eighty bushels of corn to the acre.

The same intelligent gentleman—who is one of our most careful and observing farmers—considers the sugar-beet preferable to the ruta-baga for dairy cows; but that preference cannot induce him—and in this there is a strong example for others—to cultivate the beet to the exclusion of the turnip. These two roots are planted, and of course cultivated at different seasons, which divides the labor both in planting and dressing, an object with the farmer in the summer season, when every moment of time is of the greatest value. Mr. Webb very judiciously observes—"My experiments warrant no conclusion like making the sugar-beet or any of the root family an *entire substitute* for grain in feeding stock." He recommends roots as most important auxiliaries in the economy of food. To a yoke of working oxen he gives one bushel roots per day, with grass, hay or straw. His winter allowance for a dairy of twenty cows is, from ten to fifteen bushels of roots, and from one to three bushels of chopped corn or oats per day, with as much hay and straw as they can eat.

J. N., a successful farmer residing in Delaware county, and who has been in the habit for many years past of fattening mutton for the Philadelphia market, has used, since 1837, the sugar-beet mainly, with a small portion of corn. The animals fatten on it with great rapidity. It imparts a richness and flavor to the meat which corn fed animals never possess. The consequence is, that his mutton has acquired a high repute, is quickly sold, and at a considerable advance over the corn or grain fed mutton, which is an additional gain over that acquired in the difference of feed.

Yield. We have before remarked, that from the beet, in a favorable season, on a good soil and proper cultivation, very large returns are occasionally obtained. In France, the average is reckoned at fiften tons per acre. In this country, with the same careful tillage, the average would, no doubt, double that of France. It does not, probably, at the present time, fall below twenty-five tons to the acre. But it should be recollected that here the roots grow to a much greater size than in Europe. WILLIAM ANDENREID, Esq., of Schuylkill county, Pennsylvania, raised in the year 1835, of the sugar-beet, the enormous crop of sixty-two and a half tons to the acre. JOHN SANFORD, of Marcellus, New York, has raised, according to the Genesee Farmer, two thousand bushels to the acre. These are uncommon crops. The usual yield, where soil and all other circumstances are favorable to the growth of the plant, is from eight hundred to one thousand bushels to the acre.

SUGAR from the beet, of a very superior quality, has been made at different periods and in various sections of the Union. To manufacture sugar from the beet root, to a profit, the business must be conducted on the *grand scale*. No doubt is entertained, however, that in process of time, the business will be so far simplified, as to constitute an article of household fabrication. But at the present period this is not desirable: and if the manufacture of sugar from the beet should, with us, prove a total failure, still the benefits arising from the introduction and extensive culture of the beet throughout the Union, are incalculable—accomplishing for this country what the turnip culture did for England. But that the manufacture of the beet-sugar, will ere long become general and profitable, is as certain as that the beet will grow. We would not, however, advise the farmer to give the least attention to its fabrication, especially under present circumstances. He will find it of far greater advantage to feed the roots to his stock, thereby increasing his manure—and in the event of factories being established in his neighborhood, supplying them with the products of his farm.

THE CARROT.

THIS valuable root is a biennial plant, and is found native in many parts of the world. Of the cultivated carrot there are many sorts, distinguished by their colour, size and form. These have not been derived from the wild plant of northern Europe, which no cultivation has hitherto been able to change. It is probably a native of the south of Europe. It has been long cultivated in gardens, as an excellent vegetable. But its great value as food for cattle, was not known until a few years past, and consequently, its introduction as a field crop is of recent origin.

Soil. The carrot requires a mellow soil, into which, as it is a tap root, it can penetrate freely and deeply ; it therefore prefers the sandy and rejects the stiff clays. A fertile sand, a sandy loam, a dry warm loam, or a fertile gravelly loam, are each suitable for the production of a good crop, if properly prepared, well manured, and carefully attended to. The ground ought to be ploughed as deep as possible—well pulverized, and all weeds, stones, and other obstructions, removed. If the field should receive a ploughing the preceding fall, it will be all the better for it, as it will be pulverized by the frosts of winter.

Manure, according to some, should not be given to carrots the year they are sown, from an apprehension that when the roots meet with it, they become forked, scabbed and wormy. This objection, however, will apply only to manures applied in an impregnated state—a liberal application of manure is essential to a good crop ; but it should be well rotted and made very fine, so as to offer no obstruction to the downward growth of the plant. If it meets with such obstruction, the root will divide and become forked.

Sowing the seed is performed in three ways. 1. The land may be formed into drills, and the seed sown on the top. 2. In rows, but without being on raised drills. 3. Broadcast. Of these three methods, the best under ordinary circumstances is that of rows, either on a raised or flat surface, and these rows may either have a narrow interval, as twelve or fifteen inches, in which case only the hand-hoe can act ; or at such a distance that the cultivator may be used as in other crops. Two pounds of seed, when sown in rows, is sufficient for an acre. Broadcast, five pounds. *Caution*—The seed of the carrot should be of the previous season's growth, otherwise they may not vegetate. They should in all cases be tried before they are sown ; the most frequent cause of the failure of the carrot being the badness of the seeds.

The *after culture* given to the carrot consists entirely in hoeing and weeding—that is, keeping the soil well pulverized and free from weeds. The first hoeing should be given when the plants are fairly above ground ; and the operation must be performed with great care, as it is difficult at this period to distinguish the carrots from the weeds in the rows.

Harvesting or gathering is generally performed in the month of October—they may remain later in the ground if the weather proves mild and favorable. *When stored for preservation during the winter,* different modes are practised, according to the conveniences possessed by the farmer. A cellar might be easily constructed in a side hill, covered with earth, and so guarded as to exclude the frost, in which these and other roots designed for feeding cattle could be stored.

Produce and use. The produce depends upon soil, season, method of cultivation, &c. Of late years, since the attention of farmers has been directed to the cultivation of roots, as a source of profit, immense crops of carrots have been raised; as high as eighteen hundred bushels to the acre. The average crop—(we now speak of good farms and good farmers)—is from six to eight hundred bushels.

Use. The carrot is very nutritious. As food, it is eaten both by man and beast. It is relished by every domestic animal in its raw state; and where the winters are long they are of inestimable value as fodder. For fattening animals, they are most excellent. Animals generally may be almost entirely fattened on carrots.

To save carrot seed, select annually some of the most perfect and best shaped roots in the taking up season, and preserve them in sand in a cellar until the ensuing spring, when they should be set out as early as the season may justify. In August the seed will be fit to gather, and is best preserved on the stalks till wanted. This is a sure mode of obtaining fine seed; but still an occasional change is necessary.

The *diseases* to which the carrot is liable are those common to most plants, such as mildew, insects, &c. The mildew, and worms at the root, frequently injure the crops, and are to be guarded against as far as possible, by a proper choice of soil, season of sowing, and after culture.

THE PARSNEP.

The parsnep is a biennial plant, with a fusiform root like the carrot, which it resembles in its uses and the manner of its cultivation. It is a native of Asia and of many parts of Europe. It has long been cultivated in gardens as a culinary vegetable, but is only of late, and as yet of very limited introduction as a field plant. The parsnep produces a larger crop than the carrot, averaging twenty-four tons to the acre in England.

The best soil is deep rich sandy loam, or a soil which is sufficiently deep and mellow to enable the root to force its way downwards with ease, as it has a tendency to strike deeply into the earth. It may be cultivated in drills, precisely like the turnip and potato. Indeed this seems to be the best mode of raising it—because an increased deepness, eminently favourable to the habits of the plant, will be given to the soil.

The intervals need be no wider than will admit the cultivator for the after culture of the crop; and the plants in the rows should stand from eight to ten inches from each other. All the after processes of tillage may be the same as for the carrot, as well as the soil, preparation and manure. The plant is ready for use when the leaves begin to decay. It may be taken up and stored like the carrot. The quantity of seed for sowing in drills or rows, is from three to five pounds per acre; broadcast, eight pounds.

Its *uses* for domestic purposes are well known. All animals are fond of it. To milch cows it is eminently favorable, giving a flavor and richness to their milk, which no other winter vegetables but the carrot and sugar-beet can give. Horses are fond of it, and thrive as well upon it as on the carrot. Mr. Loudon says, that thirty perches where the crop is good, will be sufficient to fatten a perfectly lean ox of three or four years old, in the course of three months. Hogs are excessively fond of it; and, when boiled, poultry may be fed upon it to advantage.

Parsnep leaves may be mown off before taking up the roots and given to cows, oxen or horses, by which they are greedily eaten. To save seed, proceed as with the carrot. The parsnep is a hardy plant, and subject to but a few diseases or accidents.

THE JERUSALEM ARTICHOKE.

This plant is, like all the plants of the sunflower genus, a native of America; and notwithstanding it belongs to our southern section, it is one of the hardiest of our cultivated plants, very productive, easily propagated, and growing on the poorest soils. Its stems vary from five to ten feet in height. It may be propagated with the greatest ease from tubers, like the potato—or from its seeds. It grows rapidly, and may be cultivated like the potato; but the intervals between both the plants and rows should be larger. It may be planted in autumn; but if planted in the spring, it will be ready for use in September.

It is customary, with some who grow this plant, to cut the stems or stalks even in July, to prevent their falling down; and, on the continent of Europe, the stems and leaves are used as green and dried fodder for cattle; but we believe this practice has not as yet been introduced into England. The tubers are in clusters, attached to the roots of the plant. As compared with the tubers of the potato, they are watery, and inferior in nutritive properties. Still it is considered valuable for feeding hogs and other animals; the tubers are generally eaten with great eagerness. This plant is in a peculiar manner fitted to grow under the shade.

The yield is frequently very large—about five hundred bushels per acre having been produced without manure. The "Complete Practical Farmer," page 145, says, that one cultivator obtained between seventy and eighty tons of this root; and expresses an opinion that three acres devoted to this culture will keep one hundred swine for six months. It is a certain crop and suffers little if any from frost. Taking therefore into account the hardy qualities of this plant—its productiveness and easy culture—it may be doubted whether it merits the almost universal neglect into which it has fallen. Granting its inferiority as an article of food to the plants now cultivated for our domestic stock, it must be of some importance to retain among us, a plant that can be so easily raised, and on soils so low in the scale of fertility.

THE SWEET POTATO.

The sweet potato cannot be cultivated to any extent or profit north of the 41st degree of latitude. In the lower counties of New Jersey, and in the Southern States, it flourishes luxuriantly. It delights in a mellow sandy soil, and the richer the better.

This excellent vegetable would be more extensively cultivated but for the great labor of planting and cultivating them in the usual mode, and for the difficulty of keeping them in the winter.

To obviate the first difficulty, I have, for about twenty years, ceased making hills altogether, and planted in ridges. I break up the ground well, and if necessary, harrow it—then with a barshear or cary plough, throw three furrows together. To complete the ridge, take a weeding hoe or fine rake, and draw the dirt up first on one side and then on the other, to about the height potato hills are usually made. Open a trench on the top of the ridge and drop the slips five or six inches apart, cover with the hand about two inches deep.

This mode is attended with several advantages—requiring less ground, less labor in preparing the ground, less in cutting the seed roots, less in bending ridges than hills, and greatly less than digging. The last operation is done mostly with the plough. After clearing off the vines run a furrow along the ridge, taking down about two-fifths on one side, return and throw off as much on the other side, leaving about one-fifth in the middle, nearly full of potatoes, which can be easily torn to pieces with the hand. A hoe will be necessary to move the dirt thrown out by the plough, so as to facilitate the picking out of the potatoes.

This mode of cultivating and taking up the crop, reduces the labor in my estimation nearly one-half.

To obviate the difficulty as to keeping, I put my potatoes in a garner in the cellar, putting chaff or dry dirt around and on them—put them up the same day they are dug. When freezing weather comes on, close the cellar windows. In this way I had sweet potatoes for the table throughout the last cold winter.

Plant about the first of April, and be sure to dig after the first frost hard enough to bite the leaves.

THE BEAN.

The bean is a valuable field plant, as affording food for live stock, and in part for man. It came originally from the east, and was cultivated in Egypt and in Barbary in the earliest ages of which we have any records; it spread from thence into Europe, from whence some of the best varieties have been introduced into this country. Of the beans which form the subject of cultivation in this country, there may be said to be, with respect to their uses, two general characters—those cultivated in the fields, and are thence termed field-beans, and those which are cultivated in gardens, and so termed garden-beans.

The varieties most commonly selected by our farmers, as a field crop, are known as the large and small white dwarfs, and the China bean. The two former are entirely white, and the latter has a spot of deep red upon it. The two former have more spreading vines, and do not ripen as soon as the latter, which grows with less vine or bush, yields well, and ripens early.

Light sandy lands are generally preferred in this country for beans; for upon such lands they do not run so much to vines, ripen earlier, and are more easily tended. English authorities state that it is well suited to the stiffer clays; that it is an exhausting, but cleansing crop. General ARMSTRONG, in his Treatise on Agriculture, states that the bean has a tendency to fit and meliorate a stiff soil for the succeeding crop.

There are three methods of planting the bean. The first in hills, the second in drills, and the third sowing broadcast. The adoption of either of these methods must be left to the judgment of the farmer, as the advantage of either will depend upon circumstances, the nature of the soil, whether it is free from weeds, and what crop is designed to follow. The produce per acre varies according to circumstances; from twenty-six to forty bushels—as many as sixty have been raised in this country, but the crop was properly attended to. In England the average is about thirty bushels.

Cultivation of the Bean. An enlightened agriculturist, furnished for the Agricultural Tracts, the following brief but comprehensive account of the method he adopted in the field culture of the bean.

> Beans may be cultivated in drills or in hills. They are a valuable crop; and, with good care, are as profitable as a wheat crop. They leave the soil in good tilth. The China bean, with a red eye, is to be preferred. They ripen early, and are very productive. I cultivated beans the last year in three different ways, viz: in hills, in drills, and sowed broadcast.
>
> I need not describe the first, which is a well known process. I had an acre in drills, which was the best crop I ever saw. My management was this: on an acre of light ground, where the clover had been frozen out the preceding winter, I spread eight loads of long manure, and immediately ploughed and harrowed the ground. Drills or furrows were then made with a light plough, at the distance of two and a half feet, and the beans thrown along the furrows, about the 25th of May, by the hand, at the rate of at least a bushel on the acre, I then gauged a double mould-board plough, which was passed once between the rows, and was followed by a light one-horse roller, which flattened the ridges.
>
> The crop was twice cleaned of weeds, by the hoe, but not earthed. The product was more than forty-eight bushels, by actual measurement. The beans brought me one dollar the bushel last fall. The third experiment was likewise upon a piece of ground where the clover had been killed. It was ploughed about the first of June, the seed sown like peas, upon the first furrow, and harrowed in. The drought kept them back; but about sixty-five rods of ground, on which the experiment was made, gave a product of twelve and a half bushels. The crop

was too ripe when it was harvested, and as it was cut with a scythe, I estimated that about two and a half bushels were left upon the ground. No labor was bestowed upon them from the time they were sown till they were harvested.

Harvesting. The bean should be suffered to ripen itself thoroughly—but not to become over-ripe. The period of ripening will be denoted by the skin of the seeds having acquired a yellowish leather like apperance. They may be cut by the scythe or by the sickle. When the sickle is used the utmost care is to be taken that the plants be cut low, both on account of the value of the straw and of the saving of such pods as may be growing near the bottom of the stem.

The beans are to be formed into sheaves, by tying them with straw-ropes previously prepared ; or, when peas are mixed with beans, by ropes formed of the stems of the peas twisted on the spot at the time of reaping. The English practice is, merely to lay the beans on these ropes in the first place, and leave them in the field for a few days to dry, before they are bound into sheaves. When the sheaves are bound, they are set up into double-rowed shocks, without any covering of head-shocks. The straw of the bean is nutritious and wholesome. For horses, it is reckoned little inferior to hay.

The bean is a plant subject to disease—the most common, a species of rust, by which it is affected in nearly the same way as wheat is by the rust or mildew. It is also liable to the attacks of insects.

THE PEA.

The pea is supposed to be a native of the south of Europe—it has been cultivated in England from time immemorial—and in this country from its earliest settlement. It has been found growing spontaneously in the western sections of our country. The varieties of the pea are numerous ; some of which are more and others less valuable for cultivation.

Of these the *field pea* alone comes within the range of our present purpose. Of this, there are two varieties, denominated from their colour the grey or white and the green,* both productive, and when separated from the skin that surrounds them, a food of excellent quality for man, wholesome, nutritive, and pleasant—and for cattle, whether in a dry or green state, much to be recommended. Sheep, cows and horses, are particularly fond of them ; and hogs are more promptly and economically fattened on a mixture of pea and barley meal, in a state of acetous fermentation, than by any other food.

The pea is extensively cultivated for use in its *green* state—and no species of cultivation is more profitable than this where it can be adopted—for the pea being ready for market in May and June, time is allowed for taking another suitable crop during the same season.

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* The small June peas, the marrowfat, and the black-eyes, are cultivated to a considerable extent, and command, generally, fair prices.

The practice of gathering them in their green state, must be necessarily limited to the vicinity of cities and market-towns, in which they command a large price. It is rather, therefore, the province of the gardener than of the agriculturist.

The pea crop is a valuable one, combining peculiar advantages with both the wheat and pork husbandry of this country. As a preparation for wheat, nothing exceeds it. In the state of New York alone, thousands of acres are annually sown with peas, and of course, as many acres are prepared in the best manner for wheat. To hogs, the pea crop supplies the best of food especially in the incipient stages of their fattening; and coming, as the crop fortunately does, to maturity at a season peculiarly useful for that purpose, gives them an additional value.

Soil and situation. A loose, warm soil, moderately rich, and the deeper and stronger for the lofty growers, is most favorable. Stable manure, or unreduced dung, recently turned in, will injure the crop—decomposed vegetable matter is the best manure that can be applied. The soil for the *early* crops should be very dry, and rendered so, where the ground is too moist by mixing sand with the earth of the drills.

Sowing. After the ground has been well prepared or pulverized by cross ploughings and the liberal use of the harrow, the drill may be laid out two and a half to four feet distance to each other, and two inches *deep:* as peas grown without sticks require the least room, the seed may be distributed in the drill according to their size and season, and as near each other as the judgment of the cultivator may direct. From a bushel and a half to two bushels are allotted per acre. The distances vary according to the size, from a half to two inches—the latter space being considered best for the largest, and the first mentioned, the smallest kind. The land is then harrowed across, and thus the seeds are sufficiently covered.

The *after culture*, though simple, should be effective. When the plants are a few feet above ground, the expanding cultivator is to pass along the intervals, the teeth being set as near the rows of plants as possible without injuring them. Then, before the plants come into flower, a hand passes along the rows, and hoes up and removes all the weeds. This completes the culture of the pea, which will now grow with great rapidity, and soon cover the intervals.

Early hoeing, in the case of this plant, should never be neglected. The effect is not only to repress the growth of weeds, until the plant shall have acquired sufficient strength, but, as in nearly all cases of tilling the ground about the stems, to give increased vigor to the growth of the plants.

From the manner of the growth of the pea, and from its stems quickly stretching over the intervals, the process of hoeing should be commenced early, and perseveringly persisted in. After the first crop of weeds is destroyed, the plants themselves will generally stifle all that may spring up during the subsequent period of their growth. This is the system under which the pea is beneficially cultivated.

The land will thus be cleaned in an efficient manner, and prepared for any crop of grain that is to follow.

In *harvesting*, the ordinary management of the pea differs but little from that of the other kinds of grain mentioned. Some employ a tool called a peas-mate, which is merely the half of an old scythe fixed to a handle. With this they are cut, and rolled up into what are called wads or wisps, and left to dry. In other cases, old blunt hooks are employed, by pulling which towards the reaper, the plant is torn and broken at the surface, rather than cut.

Diseases and Insects. The pea, like the bean, is subject to various diseases. Like it, it suffers from rust, and is rather more subject to injury from insects at the roots. The pea-bug is the most formidable enemy that the crop has to contend with in this country; but it is believed that, with proper precautions, the crop can be entirely rescued from the depredations of these mischievous insects.

It has been recommended to place the seed in a basket, and immerse the basket in a kettle of boiling water; spread the seed immediately on a floor, and plant as soon as possible. This process, while it is said to destroy the insect, does not affect the vitality of the seed. But the greatest precaution is to be observed, combined with good judgment. Others strongly recommend the sowing of *old seed*. The Hon. TIMOTHY PICKERING says, that late sowing is an effectual remedy: and Col. WORTHINGTON, of Renselaer county, New York, confirms it. He sowed his peas on the 10th of June six years in succession, and a bug has never been seen among them; whereas his neighbors, who have not adopted his practice, have scarcely a pea without a bug in it.

BROOM CORN.*

THE cultivation of broom corn is carried on to a very considerable extent in many of the rich intervals of New England; and no crop, perhaps, pays generally better on the whole. Some towns on the Connecticut are almost exclusively devoted to its culture and the manufacture of its panicles into brooms, wisps, &c., a very simple process. It is somewhat singular, that its cultivation has been confined, until within a few years, almost exclusively to New England; and it is not less remarkable, that notwithstanding its importance, in no book on agriculture can any account of the history or the cultivation of this plant be found. It is not even mentioned, we believe, in the valuable agricultural books published in New England. Its cultivation has, nevertheless, extended; and it may now be found in almost every section of the country. In some parts of Pennsylvania, New Jersey, Virginia and Ohio, it is cultivated very extensively and with considerable profit.

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* We have accidentally broken through the order of classification—having got plants cultivated for their roots, &c., under the general head of Cereal Grasses. It is, however, a matter of no importance.

The Rev. Henry Colman—we can have no better authority—says, that the seed is considered as about two-thirds the value of oats; and that mixed with corn it is excellent for the fattening of cattle and swine. The return of *seed* is often precarious, but still it is frequently abundant, and will often more than pay the whole expense of cultivation and preparing the crop for market. The seed varies from twenty to one hundred and fifty bushels to the acre, according to the nature of the soil, the quality of seed, culture and season. One thousand pounds of broom, and seventy bushels of seed to the acre, are considered a fair crop in those parts of New England where special attention is devoted to its culture. The quantity rarely falls below four hundred and fifty pounds per acre, and as seldom exceeds twelve hundred. The average, at the present day, is probably about seven hundred pounds to the acre, which with very little extra attention, might be easily brought up to one thousand, now considered by many cultivators a fair crop.

The broom corn requires a good soil, either naturally fertile or made so by the application of manures. The earth should be well pulverized; the preparation is similar to that for Indian corn. It will not only bear, but amply reward high cultivation. The seed—and very great care is to be observed in taking it from the largest and best of the preceding crop—is planted in rows; these rows are at a sufficient distance from each other to admit of easy culture with the cultivator. Sometimes they are dropped in hills, eighteen inches apart; four or five stalks are by some persons considered sufficient for a hill, others allow more.

The corn frequently attains a height of from twelve to fifteen feet, and, when uniform and in perfection, no crop is more beautiful. The New England practice is to table the corn; that is, to cut off the top or tassel, as the broom is called, and bending the stalks of two rows together, lay it down until it is seasoned and fit to be carried in. In the spring the remainder of the stalks are burnt in the field. This, we conceive, is poor economy, as they afford but little ashes. They would unquestionably prove a valuable addition to the compost heap, and should, therefore, as soon as they are topped, be transferred to the cattle and sheep yards. The scraping of the brush is an unpleasant business, and sometimes injurious to the eyes. From half a gallon to one gallon of seed is used to the acre. The price of the broom has heretofore been subject to great fluctuations; but it is conceded on all hands, that at five cents a pound it is a good crop; it more frequently commands twelve.

The expense of cultivating an acre is variously stated. We have met with no account, as yet, exceeding the following, for which we are indebted to the Rev. H. Colman.

Statement of the expenses of cultivating an acre of Broom Corn in Deerfield Meadows, in the year 1832, by Mr. Alvah Hawkes.

Dr.		*Cr.*	
May 12, 1832.			
One ploughing,	$1 25	By sale of 1000 lbs. broom, at 8½ cents,	$85 00
Holeing out, ⅓ day's work,	34	Seed, valued at	8 33
Ten loads manure, at 75 per load,	7 50		
Putting manure in hill,	2 00		
Planting, 1 day's work,	1 00		
Seed, 4 quarts, at 75 cents per bushel,	10		
First hoeing, 3½ days,	3 00		
Second do. 3 do	2 50		
Third do. 2½ do	2 50		
Horse and boy to plough for the season,	1 00		
Tabling and cutting up, 4 days,	4 00		
Gathering, carting, packing, &c	2 50		
Expense of cultivation,	27 69		
Scraping 1000 pounds bark,	3 30		
Board of man, 5 days,	1 07		
Rent of land, say	6 00		
	$38 06		93 33
			38 06
			$55 27

It thus appears that when the crop was selling at a low price, eight and a half cents per pound, it produced a profit of fifty-seven dollars and twenty-seven cents; and if it be put down at the lowest price it has ever brought in the market, say five cents, it would still leave the cultivator twenty-two dollars and twenty-seven cents per acre. The season was unfavorable, and consequently the yield of seed was trifling.

Robert G. Johnson, Esq., of Salem, New Jersey, a gentleman well known for his extensive acquirements and great practical knowledge, furnished some time since, at the suggestion of the Editor of the Farmer's Cabinet, an account of a crop of broom corn raised on his plantation in the summer of 1839. He says:

My land is a loamy soil, and in good condition, producing generally about sixty bushels of Indian corn per acre—of wheat from twenty to thirty—and of barley from thirty to fifty.

My usual method is to cart out all my manure from the barn-yard through the winter and early in the spring, so that the greater part thereof is upon the fields by the time the plough can be put into the land. The cultivation of the broom corn by Mr. Brown, (Col. Johnson's farmer,) and by him attended to until the brooms manufactured by him were sent to market, amounted, according to his estimate furnished me, to ninety-six dollars and fifty cents. While in conversation with him he drew from his pocket a paper containing the following words: "Was raised on eight acres of land, the property of Robert G. Johnson, broom corn that made four hundred dozen of brooms, that weighed one and a quarter pounds each. Many of the stalks measure sixteen feet six inches in length, and produced four hundred and thirty bushels of seed. Israel E. Brown."

I would observe that I commonly manure my land at the rate of from thirty to forty loads per acre—such was the dressing the land got previous to the planting of the broom corn. The land being in high tilth, produced, from careful attention, a most luxuriant crop of stalks; I think they must have averaged from fourteen to sixteen feet in height throughout the whole field. I have not been inclined to encourage the rearing of the broom corn more than a sufficiency for family use. I consider the broom corn a much more exhausting crop to the soil than any other grain. There appears to be an oleaginous quality peculiar to it, and somewhat analogous to flax seed, which in my judgment has a tendency to produce the impoverishment of the soil. The seed makes excellent food for hogs and cattle.

Its nutritious quality may easily be discovered from the fine color and taste which it imparts to butter from the cows which are fed on it. The best way to use the grain is to grind it with a portion of oats—say about one-third of oats to two-thirds of the seed. Indeed it is so hard and flinty that it should always be ground before feeding it to any kind of stock.

Good broom corn seed weighs about fifty pounds to the bushel. Its value compared to oats may be considered as about half as much again; so that should the market price of oats be, say, twenty-five cents per bushel, the broom corn seed would be worth thirty seven and a half cents.

Brooms. I think there is a difference of twenty-five, if not thirty per cent. in the quality of brooms sent to market, from such as I generally use in my family. I always endeavor to procure from the manufacturer, and for which I pay him an extra price, such as are made from the stalks before the seed ripens on them. A broom made from such tops will last much longer than one made from the ripe brush. But the peculiar excellency of the broom consists in its fibres being more soft and elastic, and performing the act of brushing or sweeping, similar to the brush made of bristles, without injuring the carpet if used prudently. After the broom shall have been used in sweeping the parlor, and the finer parts worn away, it will then be as good to sweep the other parts of the house as the best new broom made from the ripe corn. Ladies who set so deservedly such a high value upon their beautiful Turkey and Brussels carpets, should purchase none other than such as are made from the unripe brush. The broom made from such may be easily known by the color of the straw, which is that of tea or sage; the fibre or straw is much finer and of a softer feel than that of the broom made from the ripe corn—the color of which is red, or inclining to red.

The Farmers' Register, for January, 1839, contains a paper read before the Agricultural Society of Fredericksburg, Va., on the cultivation, product, and uses of broom corn. From this paper, furnished the Society by Mr. William Browne, it appears that that gentleman, in connexion with a Mr. C. H. Hunt, having established a broom factory in Fredericksburg, cultivated ten or twelve acres with the broom corn. The experiment, both as to the culture of the corn and its manufacture into brooms, is, so far, very satisfactory. Messrs. Browne and Hunt work mules altogether, and feed them exclusively on the grain of the broom corn. At first it was ground and mixed with chop, but the drought stopping the mills, they were compelled to feed the grain unground, moistening it with water a few hours beforehand, to soften, and cause it to swell and expand. The mules not only appear as fond of it as of other food, but they continue in good order and perform their work with much spirit. Mr. B. says that he fed his cow on this grain for some weeks, during which there was a sensible increase in the quantity of milk beyond what she yielded when fed on bran and chop. In preparing it for the cow, boiling water was poured over it, and it was kept well covered in a close vessel until the grain expanded and became soft. She ate it with great avidity. The grain is considered, generally, at least equal to oats for horses and cattle, and superior to buckwheat for hogs.

MILLET.

In Latin, Millet is called "MILLIUM," *as if one stalk bore a thousand seeds*. This plant is a native of India; whence its cultivation has gradually spread over northern Europe. Its stalks and leaves resemble those of Indian corn, though much smaller. Its cultivation in England, except as a garden plant, was unknown until after the commencement of the present century.

In Russia, Germany, Hungary, Italy, and other parts of Europe, common millet is used in the manner of rice, and furnishes a nourishing and grateful food, the seed being previously divested of their outer covering. It is rarely made into bread.

The Indian millet furnishes bread to the Arabians and other people of the east. The Arabs call the flour *dourra;* and it is truly the bread corn of Africa, being grown over all the parts of that vast continent.

Millet may be sown in the middle States from the 15th of May, until the 20th of July, and will generally produce a heavy crop of hay in six weeks, yielding at the rate of from two to four tons to the acre. If designed for *hay* alone, it should be cut as soon as the head is formed. It cures easily in cocks, keeps well, is very nutritious, and is eaten with avidity by horses and cattle.

If the object is to obtain the *seed*, which makes an excellent food for fattening swine, poultry, &c., let it remain a few days longer until the head turns yellow. Then cut, thresh out the seed when dried, and put away the hay. When the seed is permitted to ripen, the hay, of course, is harsher, but it is still a highly nutritious provender for stock of all kinds.

The soil for millet should be warm, light or sandy, rich and well pulverized to a good depth. If for hay only, three pecks to a bushel of the seed to the acre is sufficient; but if for both grain and hay, four pecks will answer: it should be sown thin and not deeply covered. "When cultivated in drills, three feet apart, and six inches in the rows, it has produced as heavy crops per acre as Indian corn, but owing to the difficulty of saving the crop, on account of birds, its ripening unequally, and its shelling out, it is generally sown broadcast." The plant, as well as its growth, is greatly accelerated by stirring the soil, after which it grows astonishingly fast and smothers all weeds.

TARES.

THE tare is one of the most esteemed of the forage plants of England. It is an annual, very hardy, and has been cultivated in Europe from time immemorial. It is said to be a native of Europe, where, according to RAY, a celebrated botanist, it was most extensively cultivated in 1686; but we presume that although so extensively diffused over that continent, it was originally introduced from Japan. We find mention made of it by the Jesuit missionaries who visited Japan and other islands in 1686. It is now cultivated with much success in various parts of the United States. It is a sort of pea, of which there are several varieties, one of which is distinguished by producing yellow seeds; two kinds only are cultivated in Europe—the winter and the spring tares.

The tare, by being sown in autumn or in spring, acquires habits so different, that many have supposed the spring and winter tares, as they are called, to be different species. They are, however, says Profesor Low, from whom we quote, the *same* species, and do not even constitute botanical varieties. But from the different habits of ripening which they acquire, they should be always sown at the periods to which they are respectively suited—that is, the winter tares should be sown in autumn, and the spring tares in spring; for repeated experiments have shown that spring tares sown in autumn will frequently perish in the first frosts, while the winter tares remain uninjured.

ARTHUR YOUNG says, in one of his Essays, "the cultivation of the tare is extending every year its importance is better understood. The author of this Essay," he continues, "feels both pleasure and pride in having been the first person who raised them on a large scale, and publicly recommended them to the notice of agriculturists. Now, in 1821, after thirty years experience of their utility, it would be difficult for him to say more in their favor than they deserve. But he takes leave to observe that they may be made one of the principal means of enabling the arable farmer to support as much live stock as the grazier. For during the time they occupy the ground they produce as much green food of the best quality per acre, as the richest grazing land; and the ground may be cleared of them in such good time, (June,) as to admit of raising a clean crop of either turnips, beets, rape, cabbages or potatoes, on the same soil in the same season—and even after the crop of rape, cabbages, or potatoes, or beets have been cultivated and removed, the same soil may be prepared and sown with either wheat, barley, rye, or pulse. By this means three valuable crops may be obtained in any place every two years."

The tare does best on a clayey soil, but will grow in any soil not too dry, provided it is rich. As this crop very soon spreads and covers the surface, a dry season is considered the most favorable, as in a moist climate, or when the season is unusually damp and wet, the stems grow with such luxuriance as very often to rot at the bottom; while on the other hand, if the season proves remarkably dry, the haulm is deficient in length.

When tares are sown in autumn, the preparation of the ground seldom consists of more than one ploughing, after which the seeds are sown in the usual manner and harrowed—nothing, however, would be lost by a more thorough tillage. When sown in spring, the land should be ploughed the preceding fall, cross ploughed in the spring, well harrowed, and receive a third ploughing if necessary, as it is always best to have the surface well prepared. As soon as sown the land should be well rolled, to facilitate the subsequent action of the scythe. If the spring crop requires manure it should be applied to the land and turned under the preceding autumn. It is a grand error to sow tares on land which is not clean and in good condition. When designed for green food at a late season, sow in spring—and in order to procure a succession of cuttings during summer and autumn, portions of the land should be sown at intervals from the middle of March to the end of May.

The *time of sowing* depends on the kind of tare and the object had in view in its cultivation. Fall sowing may take place from the middle of September to the 10th of November; and in spring as early as the state of the season will justify, but not until all danger from frosts is fully removed. The *usual mode of sowing* is broadcast, though they are better sown in rows like peas and beans, though this is by no means essential. The *quantity of seed* required to the acre is from three to four bushels—when intended for seed alone, two bushels and a half are found sufficient. It is customary to mix a portion of some of the cereal grasses with the tare, by which the quantity of fodder is increased—in their growth they do not interfere with each other. For winter tares, rye is recommended; for spring tares, oats or barley. The *after culture*, if sown broadcast, consists merely in keeping down the weeds; if the drill system has been adopted, the cultivator may be used between the rows, by which, in addition to removing the weeds, the soil will be kept loose.

Tares, when used as green forage, are cut after the pods are formed, but long before the ripening of the seed; and therefore, being in the class of crops most generally allowed to mature their seeds, they are not exhausting to the soil. But on the contrary, with relation to the farmer, they are to be considered as *restorative* crops, from the great quantity of manure which their consumption affords. They are exceedingly nutritious, and supply a larger quantity of food, for a limited period, than almost any other forage crop. All the animals of the farm are fond of it, and thrive upon it in an eminent degree. Hogs may be fattened entirely upon it. It is suited to milch cows, causing them to give more butter than any other species of food—except sugar-beet—and it is employed extensively in feeding horses. Tares are sometimes *eaten off* by sheep being penned upon them, but never by the larger animals.

Tare crops are sometimes *made into hay*, but this practice cannot be recommended in this country—here the great and only advantage is in their cultivation as green crops. The *produce* of tares cut green is, according to MIDDLETON, ten or twelve tons per acre. The *produce in seed* is also considerable, varying according to the season and other circumstances, from twenty-five to forty bushels. The *use* of the *seed* is generally for re-production. They are highly relished by pigeons, and it is not unlikely that they may prove a very good food for poultry. In Germany they are fed to horses, cows, sheep and swine. The *diseases of the tare* are very few—a crop is sometimes, but very rarely, lost by mildew."

CULTURE OF PLANTS USED FOR FORAGE OR HERBAGE.

Plants cultivated for *forage*, says Low, are those which are known and used either in a green or dried state, as the food of animals. Plants cultivated for *herbage* are consumed upon the ground where they are produced. Certain kinds of plants are better suited for forage than herbage; but many are adapted to either purpose, and therefore no distinct line can be drawn between the two classes—consequently they are treated separately on the following pages. The limits of our work will not allow us to go into a detail or description of the great variety of grasses known and treated of by botanists.[*] We shall confine ourselves to a few of the most valuable now cultivated among us—or adapted to our climate, and may be introduced profitably into the system of American husbandry.

CLOVER.

The cultivation of clover and other herbage plants, used exclusively as food for live stock, is comparatively a modern improvement. Clover, at this period, enters largely into the succession of crops on all soils—and in every productive course of management. The characteristic points of culture of this class of plants, are broadcast sowing, mowing, soiling and haymaking; and that when cut for the two last purposes, two or more crops may be had in a season from the same roots. Few things have contributed more largely to the modern improvement of husbandry, than the introduction of clover, in connection with the rotation of crops. While it tends to meliorate and fertilize the soil, it at the same time affords an abundance of wholesome food for every description of farm stock. Few if any plants surpass it in the quantity of cattle food which it affords. It was the making of the Low Countries, and although not introduced into England until the sixteenth century, it has converted some of its poorest districts into the most productive and profitable, and its effects in this country are certainly not less beneficial.

Judge Buel states, that "clover, in connection with gypsum, first became a subject of notice and culture in the counties about Philadelphia, and in Dutchess county, New York, about fifty years ago." As yet, its value has not been duly appreciated by our American farmers, and consequently but little comparative benefit has been derived from it from what might be realized from its general introduction. In some sections—embracing entire counties—its worth is known and appreciated; in many such cases it has imparted a new aspect to the country, while it improved and enhanced the value of the land and the wealth of the cultivator.

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[*] Sir John Sinclair says, that there are two hundred and fifteen different kinds of grasses, properly so called, which are known or cultivated in Great Britain. The duke of Bedford caused a series of experiments to be instituted, at a vast expense of money, to try the comparative merits and value of these grasses to the number of ninety-seven. According to these experiments, tall fescue grass, *festuca elatior*, stands highest as to the quantity of nutritive matter afforded by the whole crop, when cut at the time of flowering; and meadow cat's-tail grass, *phleum pratense*, called in New England herd's grass, and in the middle and southern States timothy grass, affords most food when cut at the time the seed is ripe. *Complete Farmer*, page 15.

The species of clover in cultivation are—1. The RED CLOVER, a biennial, and sometimes, especially on chalky soils, a triennial plant, known from the other species by its broad leaves, luxuriant growth, and reddish purple flowers. In its wild state a perennial. It is a native of Europe and America. 2. The *white, creeping or Dutch clover*, a perennial plant, known by its creeping stems and white flowers, is hardy, and suited to a great variety of soil and climate. No plant known in the agriculture of Europe, is so generally capable of cultivation as the white clover. There are varieties of it, more or less nutritive and productive. It is usually mixed with one or more of the other grasses. 3. The CRIMSON CLOVER, is a native of the southern and central parts of Europe. The color of its flowers is a beautiful red, known and cultivated in some parts of the United States as *Italian clover*. Though an annual, it is found very advantageous on dry sandy soils. In the southern departments of France, where it is extensively cultivated, it grows during the winter, (which must be very mild,) and early in spring affords abundant food for sheep; or, if left for May, it presents a heavy crop for the scythe, and may be used for soiling or making into hay. It was introduced into England so late as the year 1824—is sown in March, and is in full bloom and fit for the scythe by June. Mr. ELLMAN says it should not be sown with grains like other clovers, because it grows so fast as to choke them.

The *soil* most suitable for the clover crop is a deep sandy loam, which is favorable to its long tap-roots, allowing them to penetrate freely; it will, however, grow on almost any soil, provided it be dry. The most suitable *climate* for the clover family, is one that is neither very hot, dry nor cold. The majority of leguminous plants delight both in a dry soil and climate, and warm temperature; and clover will be found to produce most seed under such circumstances. The production of seed is only in some situations an object of the farmer's attention. A season rather moist, provided it be warm, is always attended by the most bulky crops of clover herbage.

The *preparation of the soil and the manures*, which clover receives in the ordinary course of farm-culture, are those designed also for another crop. The Farmer's Assistant says, that the best crops with which to sow clover, are barley, oats, and spring (northern) wheat. But in this way it frequently happens, that the seeds do not germinate, in consequence of not being covered. This difficulty can be obviated by a light harrowing, which will also be a benefit to the young growth of wheat, rye, or oats. Unless, however, the soils on which these crops are sown are well pulverized, and have been some years under tillage, clovers will not succeed in them, it being ascertained that newly broken up lays or pasture grounds, cannot be sown down or restored to clovers and grasses till the soil is thoroughly comminuted, and the roots of the former grasses and herbage plants completely destroyed.

Sowing. Clover is sown with other grain both in autumn as well as in spring. Some prepare the seed for sowing by steeping in water, and then mixing with powdered gypsum, as a preventive of the attacks of insects. The manner of sowing is generally broadcast. It is frequently sown in spring on the wheat crop sown in the preceding fall, and harrowed in. This process, although many plants are torn up and misplaced, instead of injuring, is of advantage to the growing crop of wheat. The depth at which the seed should be buried, depends upon the nature of the soil—half an inch may be reckoned the most advantageous position in a clay soil, and an inch in that which is light and friable. It is a very serious error, that small seeds should be sparingly covered. Misled by that error, many farmers cover their clover-seed with a bushy branch, which not only covers it unequally, but leaves a portion on the surface to wither in the air. Of clover, from ten to fourteen pounds, and of rye grass, about a bushel, are generally sown to the acre. Sown with barley, along with other seeds, in the following proportions—twelve pounds red clover, four white clover, two ribbon grass, and one bushel of rye grass.

The after culture of clover and rye grass, consists chiefly of picking off any stones or hard bodies which may appear on the surface in the spring succeeding that in which it was sown, and cutting out by the roots any thistles, docks, or other large grown weeds. A top dressing of lime, plaster of paris, marl, ashes, &c., is found very beneficial. So congenial is calcareous matter to clovers, that the mere strewing of lime on some soils, will call into action clover-seeds, which it would appear have lain dormant for ages. At least this appears the most obvious way of accounting for the well known appearance of white clover in such cases. But this great wonder is thus satisfactorily disposed of by an intelligent writer in the Farmer's Cabinet.

> There are few plants more widely dispersed over the surface of the earth than white clover; but where the soil is poor, or otherwise not well adapted to its growth, it is often so small, and grows so flat among the lower leaves of the herbage, that it is not perceptible unless a turf is cut and carefully examined by dividing it; hence, on breaking up and manuring such soils, or simply manuring by top-dressing, a spontaneous crop of white clover appears where it was never observed before, and without any supply of seed: this has led to strange conclusions respecting the propagation of this plant—many erroneously supposing that it originated from ashes or marl without the original intervention of seed. It has a perennial root, and the central root penetrates to a considerable depth in the soil, and the plant is thereby better prepared to resist the bad effect of severe dry weather, particularly on sandy soils.
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> The branches that trail on the surface send down fibrous roots from the joints which penetrate but a little way into the ground: hence it is, that the white clover maintains itself in soils of opposite natures; for if the surface be too dry to afford nourishment to the branches, the principal root preserves it; and when the tenacity and retentiveness of the soil in a wet winter is great enough to rot the tap-root, the fibres of the runners preserve the plant in safety. From this habit

of growth, top-dressings and a frequent use of the roller encourage the growth of this plant in an extraordinary degree. When the soil is thin, or does not furnish food adapted to the nourishment of this universally dispersed plant, it seldom rises to a head, and the very small leaves lay close on the ground, so that its presence is not noticed, unless by a very minute and careful examination; but when proper nutriment is furnished, it springs up, flowers, and matures its seed so as to attract attention, and it excites surprise in the minds of those who were ignorant of the previous existence of the roots in the soil.

The gathering of the clover and rye grass system is, either by cutting green for soiling, by making into hay, or by pasturing. The most approved method of curing clover hay, and one to be generally recommended, is given by Judge Buel, who urges it with confidence, being sustained by a personal practice of fifteen years.

> The object to be obtained is to cure the hay in the *cheapest* and *best* manner. The practice [heretofore generally followed] of spreading from the swarth, causes the leaves and blossoms to dry and crumble before the stems are sufficiently cured, by which means the finer parts of the hay are lost, or the crop is housed with so much moisture, as to cause it to heat and often to spoil. Clover should only be spread when it has become wet in the swarth, and should be gathered again before the leaves dry and crumble. Both these evils may be avoided and labor saved withal, by curing the grass wholly in swarth and cock. After experiencing the serious disadvantages of the old method, I adopted that I am about to recommend, and have pursued it satisfactorily for fifteen years.
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> My practice has been, to leave the clover to wither in the swarth, and when partially dried, either to turn the swarths, or to make grass cocks the same day, so as to secure the dried portions from the dew. That which is not put into cocks the first day, is thus secured the second day, or as soon as it has become partially dried. These grass cocks are permitted to stand one, two or three days, according as the weather is, and as the curing process has progressed, when they are opened at nine or ten o'clock on a fair day, the hay turned over between eleven and three, and soon after turning gathered again for the cart. Thus cured, the hay is perfectly bright and sweet, and hardly a blossom or leaf wasted. Care is required in making the cocks. The grass is collected with forks and placed on dry ground, between the swarths, in as small a compass as convenient at the base, say two or three feet in diameter, and rising in a cone to the height of four or five feet.
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> The advantages of this mode of curing clover are:—1. The labor of spreading from the swarth is saved. 2. The labor of the hand-rake is abridged, or may be wholly dispensed with if the horse-rake is used to glean the field when the hay is taken off; the forks sufficing to collect it tolerably clean in the cocking process. 3. It prevents, in a great measure, injury from dew and rain; for these cocks, if rightly constructed, (not by rolling,) will sustain a rain of some days—that is, they have done so with me—without heating or becoming more than superficially wet. 4. Clover hay made in this way may almost invariably be housed in good condition; and if rain falls after the grass is mown, the quality of the hay is infinitely superior to what it would be under the old process of curing.
>
> The *rationale* is this. The outside of the clover parts with much of its moisture while in swarth; and what is called the sweating, in cock, is merely the passage of moisture remaining in the succulent stocks, to their exterior, and to their leaves and blossoms—it is a diffusion—an equalization of the remaining moisture in the cock. When this has taken place, evaporation is greatly facilitated, and the whole mass acquires a uniform dryness, on opening the cocks to the influence of the sun and winds, if too long an exposure is guarded against. Evaporation progresses in the cocks, after the hay is gathered for the cart, and during the operation of loading and unloading.

The saving of clover seed is frequently attended with considerable labor and difficulty. It is necessary to take off the first growth of clover either by feeding or with the scythe, and to depend for seeds upon those heads which are produced in the second crop in autumn. The growth reserved for seed, after the first cutting, which should, in this case, be done earlier than usual, must be suffered to remain until the husks become perfectly brown, when it is cut and harvested in the usual manner, leaving it on the field till it is very crisp, that the seeds may become more fully hardened. It may then be laid away dry, until required to be sent to the clover-mill. When a crop of clover-seed is to be raised, it should be from the last crop of the second year, as suffering the crop to ripen injures the roots for a succeeding crop.

The produce of clover hay on some of our best lands, has been set down at four tons—three tons is about the probable average yield of the country to the acre. The produce in *seed* varies from two and a half to six bushels per acre, when cleaned. But both depends, in a great measure, on soil, situation, and season. DICKSON, in his "Practical Agriculture," says it bears hard on the fertility of the soil, to let the crop fully ripen; while others think it exhausts the soil but little.

All the varieties of clover are exposed to attacks from insects, and liable to various diseases—among them the blight or mildew. But the crop rarely suffers much from this source. A top dressing of lime and ashes is said to be fatal to the slugs.

LUCERN.

THIS is a deep-rooted perennial plant, sending up numerous small and tall clover-like shoots, with blue or violet spikes of flowers. In Persia and in Lima it is grown extensively, and in both countries it is mowed all the year round. "COLUMELLA," a Roman writer, a few of whose works on agriculture have fortunately been preserved, "estimated lucern as the choicest of all fodder, because it lasted many years, and bore being cut down four, five or six times a year. It enriches," he says, "the land on which it grows—fattens the cattle fed with it—and is often a remedy for sick cattle."

The soil adapted to Lucern is deep and of the lighter class—with a free or kindly sub-soil. Unless the sub-soil be good and deep, it is in vain to attempt to cultivate lucern. That celebrated agriculturist, ARTHUR YOUNG, says that the best are all such as are at once dry and rich. Where these do not exist, it is better not to attempt its cultivation. Two methods of raising this plant have been recommended and practiced. 1. Sowing it broadcast in spring, sometimes along with a grain crop, and sometimes without a crop: the latter is the best practice, lucern not being suited to grow freely under the shade of other plants. 2. Cultivating it in rows, which is decidedly the best method. The rows need not be more than eighteen inches apart, which will give room for tilling the intervals with the cultivator. When sown broadcast, sixteen to eighteen pounds of seed are required; when sown in rows, ten pounds to the acre are sufficient. Care must be taken to keep down all weeds that spring up among the plants and in the rows.

In the month of August of the first year when in flower, the crop may be mown, and, after the first cutting, the shoots may be kept down by a slight pasturing with sheep—but not while the soil is wet—nor continued until a late period. Early in the following spring the ground is to be horse or hand-hoed, in order that all weeds may be removed, and the earth stirred about the roots of the plants. In the month of May the crop will be ready for the first cutting. After being cut the cultivator is to be freely used in the intervals. It will now grow with great rapidity, and, when ready for cutting, is to be cut again, and, after each cutting, hand-hoed. In this manner it may be mown four or five times in the season. It does not however arrive at its full growth; after which it will yield a large return in rich and early foliage. But it requires to be manured at intervals of every fourth or fifth year. The manure may be farm-yard dung, spread upon the surface after the last cutting in autumn, or early in the spring.

The difference in the method of tillage, when the system of broadcast sowing is adopted, is, that in place of the cultivator and hand-hoe, the common harrow is used, which, passing over the surface, stirs the soil about the roots of the plants, and drags up and destroys the weeds; the plant itself is benefited by this rough treatment.

The uses of lucern are various and important. The plant is eminently wholesome and nutritive. It is well suited for milch cows, causing them to yield good and abundant milk. It is admirably adapted to the feeding of horses; and it is used with great advantage for the soiling of all kinds of stock. Care is necessary not to give animals too much at a time, especially when it is moist, as they may be hoven or blown with it, in the same way as with clover, and other green food of luxuriant growth.

The produce of lucern cut four times in the season varies from five to eight tons to the acre. The probable average, all things favorable, may be set down at seven tons. But well authenticated instances are on record of immensely large crops having been raised.

To save the seed, lucern may be treated precisely as the red clover. It is contained in small pods, and more easily separated than the clover seed. The *diseases* and *enemies* of lucern appear also to be the same as those of clover.

The following system has been adopted for a few years back by the farmers in the state of New York, and many of the eastern states.

"No crop gives so great a product of forage during the summer, and all domestic animals are fond of and thrive upon it. It is in condition to cut from the 15th to 20th of May, and will give three or four cuttings in a season. An acre of good lucern will keep six cows well from the first cutting; and as soon as the whole has been cut over to supply this number with food, the earliest mown will be fit to cut a second time. I have cultivated lucern ten or a dozen years, and it has been almost my whole dependence for the summer support of my cows and a yoke of oxen. An acre has been worth to me fifty dollars a year. But to insure a profitable crop, certain requisites are necessary, some of which I shall name.

"Lucern must be sown on a dry soil. The roots penetrate four to six feet, and these will neither grow nor live where there is water. Sand, gravel, or loam are the best soils for it.

"It should be sown on a rich and clean soil. Without the first, the crop will be diminutive; and if weeds abound, they will rob and choke the young lucern, which is feeble during its early growth. The best preparation for it is a crop of potatoes, well manured and well cleaned in tilling.

"Sow sixteen pounds to the acre broadcast, with half a bushel of winter rye, early in May, in ground well pulverized, harrow in the seed, and follow with the roller. Or the seed may be put in with a drill-barrow at twelve to eighteen inches between the drills, at the rate of ten pounds the acre, and in this case the intervals should be kept clean with the hoe or otherwise. The duration of lucern is six to ten years; though it sometimes, like clover, suffers from the winter.

The seed may be had at the seed shops in our cities at twenty-five to thirty cents per pound.

"To make lucern into hay, it should lie in the swarth to wilt, and then be put into small grass-cocks with a fork (not rolled) to cure. After standing a day or two, the cocks may be opened two or three hours under a bright sun, the hay turned, and soon after housed. If spread like ordinary grass, the leaves dry and crumble ere the haulm or stalks are cured, and thus the best part of the fodder is lost. I have mixed lucern, partially cured, in alternate strata with dry barley straw on the mow, and found that cattle greedily consumed both in winter, when fed out in the yard."

Among the inferior herbage plants which are occasionally cultivated in England, and sometimes with us, by way of experiment, are sainfoin, burnet, ribwort, furze and spurry. Those which might be cultivated are very numerous, and include several species. Very few are worthy the attention of the professional farmer.

GRASSES.

THE most important of the herbage plants of all countries, are the grasses, which are found clothing the surface of the earth in every zone, "attaining generally a greater height, with less closeness at the root in the warm climates, and producing a low, close, thick, dark green nutritive herbage in the cooler latitudes." Many of the grasses, however, are of low nutritive and productive powers, and in cultivated grounds are held to be weeds; but some of the less valuable require attention on account of their frequent occurrence, and their peculiar adaptation to soils low in the scale of fertility.

With respect to the general culture of grasses, though no department of agriculture is more simple in its execution, yet from their nature considerable judgment is required in the design. The creeping rooted grasses will grow readily on moist soils; but the fibrous rooted species, and especially the more delicate upland grasses, require particular attention as to the soil in which they are sown; for in many soils they will either not come up at all, or die away in a few years. Hence, in sowing down lands to permanent pasture, it is a good method to make choice of those grasses which thrive best in adjoining and similarly circumstanced pastures, for a part of the seed, and to mix with these what are considered the very best kinds.—*Loudon*, p. 887.

A very judicious writer remarks, that it is a bad system to mix seeds of different plants before sowing them, in order to have fewer casts. It is better to sow each sort separately, as the trouble of going several times over the ground is nothing compared to the benefit of having each sort equally distributed. Grass-seeds cannot well be sown too plentifully, and no economy less deserving the name can possibly exist, than the being sparing of grass seeds. The seeds of grain may easily be sown too thickly, but with respect to those of grass, it is scarcely capable of occurring. The smaller the stem, the more acceptable it is to cattle; and when the seeds of some grasses are thinly scattered, their stems tend, as it is called, to wood, and the crop is liable to be infested with weeds. Some think that if ground is well manured, good grasses will come in of themselves. Perhaps so; but how long will it be before that happens?

Clean seed, and that which is known to be suitable to the soil, should always be sown. For though grasses will gradually come in, no great crop is to be expected the first year, unless it be a crop of rank and useless weeds. And he that misses the first year's crop, loses much, as the longer the land lies, the more compact or bound it will become, and produce the smaller crops. Every farmer should carefully examine his fields that are coming into grass for next summer's mowing, and carefully note all the bald spots, where, by the lodging of grain or from any other cause, the grass roots have either not taken or been destroyed. On all such spots grass-seeds should be applied at as early a period in the spring as possible. Failures of this sort generally are found where the soil is strongest, and if grass-seed is not resown, there will be an abundant supply of weeds to annoy the careless farmer.—*Farmer's Cabinet*, vol. iii. p. 153.

The limits of this work will allow us to notice only a few of the most valuable kinds of grasses.

MEADOW FOXTAIL.

This is a very generally diffused species, of early growth; hardy, herbage nutritive, and apparently grateful to ruminating animals; sheep and horses have a greater relish for it however than oxen. It is perennial, and in England constitutes a considerable part of their richest meadows, and is one of the six kinds of the best British grasses for either dry or watered meadows. When the soil is neither very moist nor very dry, but in good heart, this grass is found to be very productive, continuing till late in autumn to throw forth its flowering stems. LINNÆUS recommends it as a suitable grass for grounds which have been drained; and Mr. CURTIS states, that it may be mowed three times in a year.

ORCHARD GRASS OR ROUGH COCK'S FOOT.

This is a native plant, coarse, but very nutritive, of early and rapid growth. In England, where it was introduced from Virginia in the year 1780, it is generally sown with clovers. It is justly held to be one of the superior pasture grasses, and is suited for forage as well as for herbage. It requires to be closely cropped. It grows well on loamy and sandy soils, and is not much injured in its growth by shade. LORAINE says, "it is very valuable. When cut by the scythe it neither waits for fresh shoots from its roots, nor until its wounds be healed, but continues growing on just as if nothing had happened. The leaves which have been cut, will grow on a rich soil, nearly, if not quite, one inch in twenty-four hours, forming new points gradually as they increase in length."

This (orchard) grass is worthy of being cultivated on account of its uncommon luxuriance. Horses, cows, and sheep eat it readily, and it is valuable on account of its excellent after-feed. It affords an abundant crop, springs early, and grows fast, makes excellent hay, and yields abundance of seed, which is not easily shaken out. It is a hardy grass, found highly useful in moist loamy soils, and thriving under the shade of trees. It comes early, is soon mature, and continues green until late in the season, as clover does. If intended for fodder, it should be cut while young and tender.

The quantity of seed to the acre is usually one bushel. JOHN HARE POWELL, Esq., who was many years since a successful cultivator, recommends two bushels to the acre. LLOYD JONES, Esq., in a communication read before the "Pennsylvania Agricultural Society," states, that he has cultivated orchard grass for twenty-five years, and he considers it as the best herbage for pasturage upon *upland*—for hay it certainly cannot be excelled. When his crops failed, it was owing to the bad quality of the seed; of this there can be no doubt, as he never lost a crop after he raised and secured his own seed. His method of saving the seed is this:

When in a state in which they can be shaken from the heads, the stems are cut by a skilful cradler just above the tops of the under grass. After some practice, he is enabled to catch with the left hand, the portion taken with the cradle, and to place them regularly as he advances. They are immediately bound in sheaves about as large as a man's leg. Double swarths are afterwards mown with a naked scythe to remove the under grass, and leave, at proper distances throughout the field, openings upon which the sheaves are shocked; in which state they remain from eight to ten days, until sufficiently dry to be carried to the barn, where they are forthwith threshed to guard against heating, the great source of injury to this valuable crop. The usual manner of securing them by putting the sheaves into the mow, is, I am satisfied, the most effectual mode to destroy the principle of vegetation, as they can rarely be so treated without being mow-burned. After having been threshed, they should be strewed upon the barn floor—occasionally stirred if the quantity be large, during eight or ten days, until they are perfectly dry—without this precaution they would inevitably be heated.

The under grass should all be mown for hay as soon as possible, after the seeds have been harvested. If it be allowed to stand but a few days, it loses its nutritive properties—in fact dies, after having lost the heads. The hay thus made, and properly secured, although necessarily harsh from having been allowed to pass the stage of its growth when most succulent and nutritious, I have found good fodder for both horses and neat cattle.

The product of seeds varies from ten to twenty bushels per acre. I have had in a very favorable season twenty bushels upon land which would not have afforded, I think, ten of wheat. The product of this, as of all crops, depends much, of course, upon the season and the preparation of the land. The crop to which I advert was purposely grown upon a poor soil, to show the excellence of the plant, and the fallacy of the assertion, that it required very rich land.

I sow from eight to ten quarts of clover seeds, and a bushel of orchard grass seeds per acre in February, upon wheat or rye land. I should prefer their being sown with oats or barley, as the seeds could be covered more regularly with the harrow, and their vegetation would be secured. I do not apprehend injury from frost in early sowing, but I dread the effects of drought from late. I have never suffered from early, but have generally had cause to regret the evils of late sowing.

TIMOTHY.

Timothy is a well known favorite and native grass of the middle and northern states; it also flourishes well in the Carolinas, whence it was introduced into England by TIMOTHY HUDSON, about the year 1780. It is known in English practice as the *meadow cat's-tail* or *timothy grass.* In New England it is called *herd's grass;* while in other sections of the United States it is known as the *herd's of the north*, or *red-top timothy.*[*][†] It succeeds best in strong and moist soils, and does well in low grounds, greatly improving moist meadows overgrown with moss. On moist and rich soils it is very prolific. There is none of the grasses more easily cultivated, and what is of great importance is, that when cut in the seed it affords more than double what it does when cut in the flower. Of its very superior value, no doubt is entertained.

The *best way of sowing* it on low moist grounds, is immediately after they have been cleared and drained; on uplands, it is best sown with red clover, as the mixture not only makes hay of an improved kind, but the timothy, from its long, firm, upright stalk, will support the clover should it be inclined to fall or lodge. It is not to be mixed with clover in laying down meadows. The "Farmer's Assistant" says, that it fails in rich arable soils in consequence of the sward becoming bound and thickened with other grasses; that, if not too closely pastured in the fall, harrowed every spring, and stock not permitted to enter upon it for a suitable time, it will last many years; and that in the rich and kindly soils, unless destroyed by close pasturing, it will last beyond the memory of man.

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[*] Dr. DARLINGTON, in his "Flora Cestrica," says, "this grass is a *native of Europe*, but extensively naturalized in this country—generally cultivated in Chester county—and is undoubtedly one of the most valuable grasses known to our farmers. Mixed with red clover, it makes the best quality of hay. It requires a good soil, and is considered as an exhausting crop. The seed is usually sown in autumn, among, and immediately after, wheat and rye. It succeeds well when sown in spring."

[†] Professor LOW and Mr. LOUDON, both state that it is a native of Britain, *but* that it was first introduced into notice from Carolina, and we believe that Judge BUEL in his tables claims it as a native plant.

The produce on good soils, when not pastured, is four tons to the acre—frequently more, at two cuttings. When not pastured it yields nearly double the quantity of hay. The produce per acre in seed varies greatly—from ten to thirty-four bushels; the saving of the seed does not essentially diminish the yield of hay, and as it is easily gathered, separated and prepared for market, is a matter of considerable importance to the farmer, especially as the seed has always a ready market, and produces a fair price. Timothy should not be cut until it is in blossom, or a little later.

TALL (MEADOW) OAT GRASS.

TALL meadow oat grass, sometimes called the "*Egyptian oat*," and the "*Peruvian grass*," vegetates with uncommon luxuriance; flowers in England in June and July, and though coarse, is very profitable when closely fed down. It makes but an indifferent hay, but what is of great importance to the American farmer is, that it produces a very plentiful aftermath. It is the *Wiesenhafer franzosisch ray-grass* of the Germans. Mr. SWAYNE asserts that it yields a greater weight than any other description of grass; but according to Sir H. DAVY, although very productive, it is disliked by cattle, especially by horses; which, he says, perfectly agrees with the small portion of nutritive matter it contains. JOHN TAYLOR, Esq., of Caroline, President of the Agricultural Society of Virginia, and Dr. H. MUHLENBURGH, of Lancaster, Penn., speak of this grass in the highest terms of commendation, recommending it with great earnestness to the attention of the American farmer. The last named gentleman says:

> I have cultivated this grass for a number of years, and find it, after a great many trials of pretty near all other grasses, the *earliest*, *latest* and *best* grass for green fodder and hay. It blossoms in the middle of May, the same time with the common red clover, and the seed ripens a month later. Horses, it is true, do not like it green, at least not all of them, but eat it in hay. Horned cattle prefer it to all other grasses. It will grow best in clover soil, and the leaves are from two to four feet high before it blossoms. In the blossom the stalk rises from five to seven feet. It ought to be cut in blossom about the end of May, [from the middle of June to the 5th of July in New York and the eastern states,] and will yield an abundance of sweet good hay. The seed may be sown in the fall or spring, with or without grain, and must be brushed in or lightly harrowed. If mixed with clover it will make uncommon good upland meadow.

FLAT STALKED MEADOW GRASS.

This grass flourishes in dry soils and flowers from July to August. Its dark Saxon leaves are compact and succulent, and grow so firmly together as to form a pile of the richest pasture grass. It produces a fine turf, admirably adapted to yards and lawns, and also imparts a most delicate flavor to the flesh of sheep, to which it is peculiarly grateful.

SMOOTH STALKED MEADOW GRASS,

Is a native plant, and better adapted to laying down permanent pastures and meadows than any other grass, with the exception perhaps of rye grass. According to Scole, an eminent farmer, it is the best of all the grasses; its foliage begins to shoot and put on a fine verdure early in the spring, but not so soon as some other grasses. Every animal that eats grass is fond of it, while at the same time it makes the best of hay, and affords the richest of pastures. It delights in rather a dry than a moist soil and situation; but it thrives most luxuriantly in rich meadows. It yields an abundance of seed, which, in a separate state, are difficult to sow, on account of their filaments causing them to adhere together. To counteract this, they are mixed with a portion of newly slaked lime, in order to separate them; but not in such quantity as to injure the seed. They are then well rubbed in a sufficient quantity of dry sand, after which they may be sown.

ROUGH STALKED MEADOW GRASS.

Dr. Darlington says this species bears a strong "resemblance to the preceding, when growing in open grounds—but is far superior in value." In England it is held in high repute, being considered as one of the superior pasture grasses, forming a part of the richest meadows. It is nutritive, and greatly relished by pasturing animals. It delights in moist and sheltered spots; hence it is found naturally in moist meadows, and the edges of wet ditches. In dry and exposed grounds its produce is inconsiderable; and this circumstance must determine, in certain cases, the expediency of cultivating it. It is considered as one of the six best British grasses for laying down either dry or watered meadows.

RYE GRASS.

The Perennial darnel, or rye grass, is regarded in the north of England, and in Scotland, as one of the most important of the gramineous herbage plants. According to Low, it is more generally cultivated in Europe than either of the other herbage plants. This is owing to its early maturity, its wide range of temperature and soils, and to the abundance and facility with which it is raised from the seed. However valuable the rye grass from these qualities, it wants certain properties which others of the grasses possess, and a good permanent meadow, therefore, will best be procured by imitating the natural process of mixing grasses together. In this manner, the different kinds coming into flower at different periods of the year, will better afford a succession of herbage throughout the season.

The character of this plant is greatly modified by the effects of climate, soil and culture; and it may be owing to one, or perhaps to all these circumstances combined, with a slight admixture of *prejudice*, that it has fallen into disrepute among our farmers. This grass has been too much neglected, and we entertain no doubt, that with proper attention, it may be made to enter far more prominently into our system of agriculture than it has heretofore, and with decided profit. Perhaps one reason why it has been almost wholly neglected is, that it has lacked the sanction of great names. This is wrong. Every farmer should, in the first place, understand perfectly the nature and properties of the soil he cultivates, the crops best adapted to that soil, which is easily determined; and then, by adopting a judicious rotation, cultivate such as may be most advantageous.

BLUE GRASS.

This well known grass affords a most nutritious pasture, and for this reason it has of late years become a great favorite with our western farmers. It is now most extensively cultivated in Kentucky and Tennessee, and is rapidly coming into use in all the grazing districts. It grows remarkably well under cover of woodland, and is also much esteemed as an important part of the mixture of seeds in laying down lands to grass. Professor Gordon of Clinton College, Tennessee, who has with much care and patience investigated its merits, speaks of it in the highest terms of commendation. Dr. Darlington says that "it is not so much esteemed as the green meadow grass, and is sometimes rather troublesome in the rotation of crops, by its tenacity of life." The Domestic Encyclopædia says that it is particularly proper for soiling, and that it will bear close and frequent mowing.

SOILING.

No question is now entertained of the great utility and consequent advantages arising from the soiling of cattle, when reduced to a correct system and conducted on judicious principles. The system was derived originally from the Netherlands. It is very old, but by no means a universal practice. In all thickly settled parts of the continent it is now becoming more generally adopted. As a country becomes populous, well cultivated and rich, soiling is the mode of feeding cattle, which must ultimately prevail. On this principle it is, that we find it practiced in the vicinity of cities and large towns. But although it is the most profitable system of feeding where it can be adopted, yet it is in some cases not practicable, and in others not expedient.

Professor Low says, that the cases in which it is not *practicable*, are when the land does not possess a sufficient degree of natural or acquired fertility to produce good and early crops of grass; or when a sufficiency of straw to keep the animals dry and well littered during the period of feeding cannot be obtained. The cases in which soiling is not *expedient*, although practicable, are, when the animals to be fed require excercise to keep them in health and in a growing state. Some say that the practice is unnatural—that animals reared on this system are deprived of air and exercise, and the selection of their food; and in the experience of some farmers, cattle thrive much better in the fields or open air, than when housed.[*] But the principal objection is easily obviated by allowing sufficient yard room for exercise, air, &c.

On the other hand the advocates of the soiling system say—*That it is a considerable saving of land;* that is, one acre of cut grass soiled being equal to three acres of the same field pastured. The grasses grow much more rapidly in consequence of not being trampled upon. *It is a great saving of food*, for when, say the compilers of the Complete Grazier, "animals are suffered to go upon the field, many plants are necessarily trodden under foot and bruised, or partly buried in the earth, in which state they are greatly disrelished by cattle, and are suffered to run to waste; a circumstance which never could occur, if the practice of cutting were adopted." If the consumption of plants is an object, that object is obtained by soiling, for all who have paid attention to the subject must have observed that cattle will readily eat plants cut, and given to them when housed, which they would discard in the pasture; yet according to the authority above quoted, it is known that they will eat food, when thrown to them on the ground, which they will reject when given in the stall. Many of the grasses which are sweet and succulent when young, and which cattle eat with the greatest avidity, are quite offensive when suffered to get into ear, and are thereby lost; but by this system of cutting, no loss can occur from this quarter. Plants rejected by one classs of animals, when presented to them, even when housed, are not on that account less acceptable to others; indeed they appear to be eaten with greater avidity. "Thus grass, or other food, that has been *blown* or *breathed upon* by any animal for a considerable time, becomes unpleasant to other beasts of the same species, but not so to stock of another class or variety; for them, indeed, it appears to acquire a higher relish."

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[*] It is not to be wondered at, that cattle that have been accustomed to run at large and select their own food, should for a time refuse to eat the best grass, when cut and given to them in the shed or yard, when first put up. Neither is it surprising that some will not fatten at all under such circumstances. Mr. Lorain says the cause is evident: "The previous habit of the animal is entirely opposed to the sudden change—from being accustomed to run at large and gather such plants, or such parts of them, as are most agreeable to its taste. Experience also teaches us, that men, as well as the inferior animals, when deprived of that portion of liberty to which they have been accustomed, repine, and, in some instances, actually die from this cause alone."

It is contended by the friends of the cutting system that the balance, so far as regards the *health and comfort of cattle*, is decidedly in its favor over that of pasturing. Cattle are not only less liable to accidents, but do not suffer the same inconveniences or annoyances to which they are subject when exposed to the sun in the open air—they suffer much less from heat, flies, &c., and it is perfectly reasonable to suppose that they take on flesh more readily. Tranquility and ease are essential, otherwise animals cannot thrive. An instance in point has been cited, from which it appears that animals housed for fattening, and well fed, did not take on fat, owing to the circumstance of their becoming lousy, in consequence of fowls roosting over them. The reason why they did not thrive is obvious—when cleansed of the vermin they fattened well. Heat, restlessness, the terrible annoyance of flies, &c., when cattle are exposed, as they must frequently be in pastures, operate against them.

It is ascertained that the proportioned increase of manure obtained by soiling and stall feeding abundantly evince their superiority over pasturing. "Manure is the life and soul of husbandry; and when tillage is an object of attention, there can be no comparison between the two modes of consumption, especially in regard to manure obtained by soiling live stock during summer with green food, for in consequence of the increased discharge of urine during that season, the litter, of whatever substance it may consist, is speedily converted into dung."

The late Mr. Lorain, after many years experience, recommends this system of management in the highest terms. He was, in connection with the late Judge Peters, an early and ardent advocate of the convertible system of husbandry, and was of opinion that, by the addition of soiling to that system, the practice of agriculture would be as perfect as our present knowledge of that art, and the instruments best calculated to effect the labor, would admit. Mr. Lorain's high estimate of the soiling system, as we have observed, was the result of years of experience, and the most careful investigation. The following is the substance of his opinion:

> Soiling will not only save much more than half the grass necessary for pasturing the stock, but it will also introduce a great additional quantity of manure. The manure thus obtained is not only greater in *quantity*, but much superior in *quality*, is secured from injury and applied in that manner deemed most beneficial to the farm. When soiling is practiced the grounds are not hard trod, and sunk into holes by the feet of cattle. The working horses and cattle are always at hand; and, as they have no trouble in collecting their food, they are quickly filled, and soon ready for service. When live stock are confined in well fenced yards, the farmer may sleep quietly—his crops are not injured by their breaking into his fields. Division fences, too, are saved; they are costly and a nursery for weeds.

Mr. Nicholson, in his Farmer's Assistant, refers to a communication from Professor Von Thaer, of Hanover, detailing the result of the experience of Baron De Bulow and others. The experiments made, run through a series of years, and are represented by the learned Professor as highly satisfactory, fully establishing the superiority of the system over all others adopted for the feeding of cattle on green forage or herbage. From the great mass of testimony thus collected, Dr. VON THAER lays down the following as facts, which he says are incontrovertible ; and numerous subsequent experiments, both in Europe and this country, fully confirm this opinion.

1. A spot of ground, which, when pastured, will yield only sufficient food for *one* head, will abundantly maintain *four* when left in the stable. 2. Soiling affords at least double the quantity of manure from the same number of cattle ; for the best summer manure is produced in the stable and carried to the fields at the most proper period of its fermentation ; whereas, when dropped on the meadow and exposed to the action of the air and sun, its power is much wasted. 3. Cows which are accustomed to soiling, will yield much more milk when kept in this manner, and fattening cattle will improve much faster in weight. 4. They are less subject to accidents and diseases—they are protected from the flies which torment them in the fields during the warm weather; and they do not suffer from the heat of summer.

Many other advantages are enumerated. Grazing also has its advantages. Experiments, however, render it certain that soiling, under favorable circumstances, is the most profitable. The Hon. JOSIAH QUINCY, of Massachusetts, ascertained that seventeen acres of land, under the soiling system, supported as much stock, and in as good, if not better condition, as had previously required fifty ; and Sir JOHN SINCLAIR states, that thirty-three head of cattle were soiled from the 20th of May to the 1st of October, on seventeen acres and a half, of which fifty were necessary in pasture. The saving of land was consequently thirty-two and a half acres.

In the Farmers' Series of the Library of Knowledge, the *soiling of horses on green food* is favorably noticed ; and that they can be supported with great health and vigor, in the yard or stable, with proper management, is conceded—but its "*economy*, however, must depend on the proportion which it bears to the price of dry food, and its convenience to the quantity in which it can be spared for other cattle." The experience of many hundreds of farmers is cited to show, that horses maintained for years in this manner, have neither lost flesh nor strength, although there was no perceptible saving in their work—and that, though placed on dry food during the winter season, they continued in the possession of perfect health.

It is a most excellent plan to give some green food along with the corn and chaff, before the usual period of feeding entirely on dry fodder.[*] The change from green to dry and again from dry to green, should be (very) gradual. In its commencement, the clover and tares should be cut and mixed in small portions with straw, and a proportionate quantity of grain should be reduced. The green food is then insensibly increased, until the grain is entirely omitted, and the quantity of green food supplied without limitation. It should, however, be cut overnight,[†] (late in the evening,) and given only in small quantities gradually increased, to guard as much as possible from accidents, which may arise from its succulence, from hooing.[‡] When horses are soiled, they never should get much at a time, a practice far too prevalent.

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[*] No animal should be fed entirely on dry fodder—it is a bad practice.

[†] Grass for neat cattle should be cut in the morning—is much more relished and the fattening greatly expedited, if the grasses are cut fresh, frequently through the day. Cattle are disgusted with grass which has been lying too long before them, in the sewers or cribs, or if left in the field until withered or heated, which speedily takes place.

[‡] Hooing may be guarded against with care. The disease is produced by the *quality*, and not the *quantity* of food, but it is of course rendered much more dangerous by an increased quantity.

The artificial grasses used for soiling are the same as those suitable for dry forage or hay ;[*] but *tares*, where raised, now take the lead, as the winter sown are generally earlier ready than any of the grasses —with perhaps the exception of rye-grass in some localities—and affords a much heavier crop. Soiling, when reduced to a system, requires a regular succession of green crops ; it is therefore advisable that winter and summer tares (whenever they prove a certain crop) should be sown at different periods, so as to afford a constant supply, both before the clover comes in and after the first crop is cut off. Lucern is one of the most valuable plants for soiling. A well authenticated paper, in the Communications to the (English) Board of Agriculture states, that in one year twenty-three horses have been kept twenty weeks ; and in the next, twenty-eight horses during eighteen weeks, upon eleven acres of lucern alone, which gives an average of three roods per horse in nineteen weeks.

In Holland and Flanders where the feeding of cattle is supposed to be much better understood than in most countries, the summer soiling of farm-horses is limited to half an acre of meadow grass, cut and carried to the stable, from the middle of May to the middle of June, from which time to the end of August one-sixth of an acre of clover is added, with two pounds of beans daily ; and from thence to November, when the winter feeding commences, the clover is replaced by an equal quantity of carrots. From the number of horses stated, in this instance, to be kept in proportion to the tillage—eleven to one hundred and fifty acres of alluvial soil—their labor can, however, be only light, though a pair is said to draw a ton and a half of manure in the field, and three ton upon the road.

After viewing all inconveniences, a great variety of circumstances concur to prove most satisfactorily, that the practice of *soiling* or feeding cattle during the summer season with different green and succulent vegetables, which are cut and carried to them, and of *stall-feeding* them in the winter season with dry fodder, in conjunction with various nutritive roots, such as the *sugar-beet*, ruta-baga, carrots, &c. will, in general, be found highly economical.

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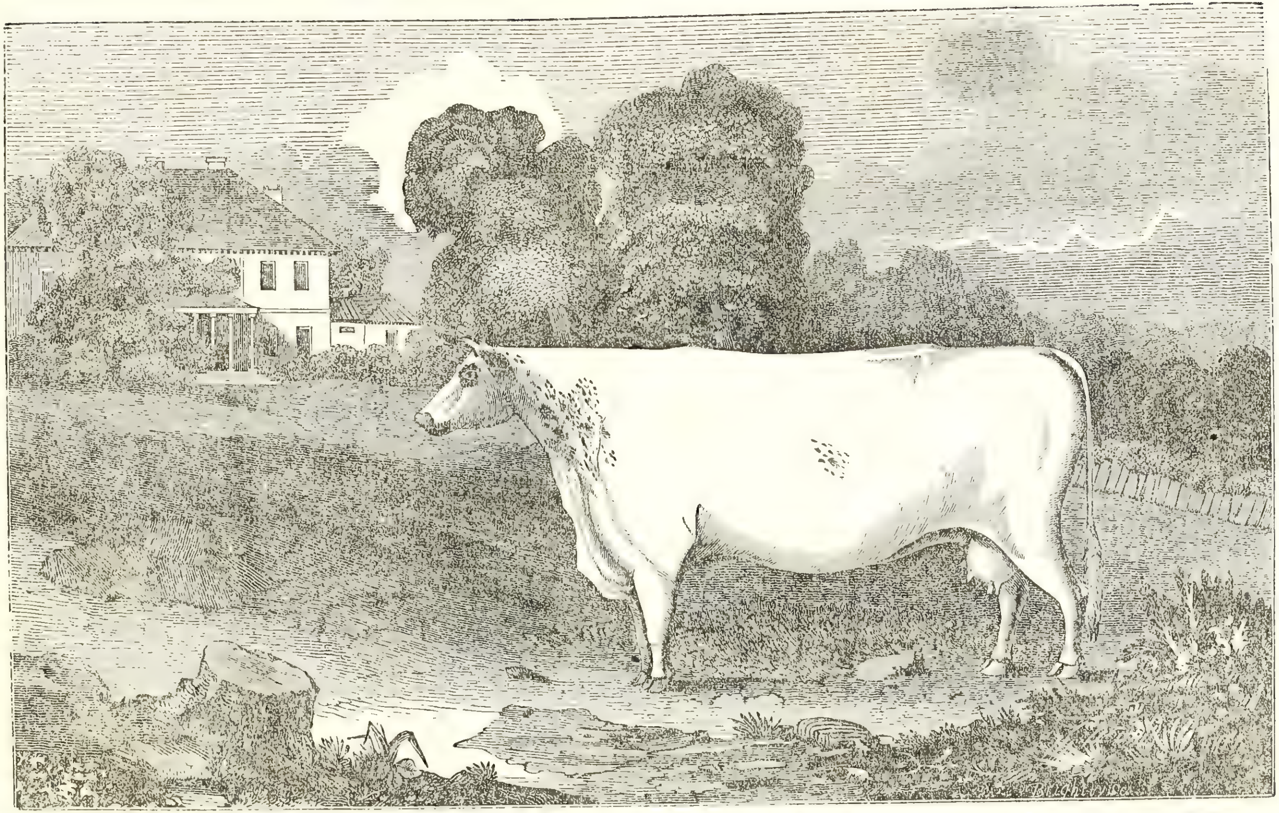
[*] In some places meadows are mown for this purpose.



CINDERELLA.—THE PROPERTY OF C. B. CALVERT, ESQ., OF RIVERSDALE, PRINCE GEORGE'S CO. MD.

THE DAIRY.

Dairy is the term universally applied to the place where the milk of cows is kept and converted into butter or cheese, or both. The operation is called *dairying*. The dairy-house, if properly constructed, will consist of three apartments, viz: one for milk; another for butter in churning; or for scalding, pressing, and salting cheese; and a third for implements—over which, in cheese dairies, a store-room may be placed if deemed necessary.

In the practice of the dairy in this country, milk may be consumed in three ways. The first is in the form of milk for food—and this is the most profitable, where, from the nearness of the market, and the demand for the produce, it can be adopted. In the vicinity of cities and large towns, dairies are formed merely for the production of milk; these usually form the largest class of dairy establishments. But the sale of milk in its fresh state, is necessarily limited to a certain circle around the different markets of consumption.

The next, and most profitable production of the dairy, is butter in a fresh state. This circle is more extended than that of milk alone, because butter can be preserved longer, and conveyed to a much greater distance. At a greater distance still the produce consists of cheese, and sometimes cheese and butter—when the latter is produced it is put down in tubs and firkins, and salted for preservation. We believe that in this country the combined production of cheese and butter is attended to in nearly if not all our dairies.

A dairy, more especially if within the reach of a ready market, may be profitably conducted on a moderate scale, in conjunction with an arable farm; as a small portion of pasture land, either natural or artificial, will answer every useful purpose in connection with the sugar-beet, ruta-baga, and other roots, which are easily raised in great abundance, and which, as a general rule, in the hands of competent persons, not only cause an increase in the *quantity*, but also a great improvement in the *richness* and flavor of the milk and butter produced from an equal number of cows. The dairy business is in no degree hazardous, if it is conducted as it should be, as well as all other departments of agriculture—on sound principles. The market is subject to few or trifling fluctuations.

There are various points essential to the successful and profitable management of a dairy. A few only of the most prominent are here noticed. 1. The animals should be of a good breed; that is, kind and free milkers. 2. The greatest care and attention should be devoted to them in order that they may be kept in good heart and condition. 3. Suitable buildings and implements necessary to the complete and perfect management of the dairy. 4. Skill, and the utmost cleanliness and attention on the part of those persons, (whether proprietors or hired for the purpose,) to whom the business may be confided.

As regards the animal best adapted to the purposes of the dairy, a great diversity of opinion prevails among gentlemen most deeply interested in the subject. Some hold the *short-horns*, which certainly possess many excellent points, in the highest esteem; while others, equally competent to come to correct conclusions, give a decided preference to *long-horns*. The fact is, there are good and bad milkers to be found among all breeds of cattle—and this difference is owing to a great variety of causes. It is of great importance to know the temper of a cow—it may appear as a trifling matter at first view, yet, from our experience, we regard it as one of great importance. A cow of kindly disposition, gives but little trouble in her management—parts with her milk readily and cheerfully, and yields a far more abundant supply than one of an unruly disposition. A farmer ought not to keep an unruly animal, it is a source of continual vexation, frequently of loss, beside the tendency of its bad example.

Upon the form and qualifications of a perfect cow we refer to Mr. YOUATT, merely observing that, whatever breed may be selected, there is a wide difference between the form of one meant for fattening, and that intended for the dairy. "Thus, while the former should have all the best points of the ox, as nearly as possible, the milch cow should, on the contrary, have a long thin head, with a brisk but placid eye—thin and hollow in the neck—narrow in the breast and the point of the shoulder—altogether light in the fore-quarters—wide in the loins—little dewlap—neither too full fleshed along the chine, nor shewing in any part an indication to put on much fat. The udder should especially be large, round and full, with the milk veins protruding, yet thin skinned, but not hanging loose or tending very far behind. The teats should also stand square, all pointing out at equal distances, and of the same size; and although neither very large nor thick towards the udder, yet long and tapering to a point. A cow with a large head, a high back-bone, a small udder and teats, and drawn up in the belly, will, beyond all doubt, be found a bad milker." The hide should be thin, the hair fine and soft to the touch, and the tail small.

The most desirable qualities of a dairy cow are, that she should give an abundant supply of milk, and that of a rich kind—that she should be perfectly kind and docile, and readily yield her milk—fatten easily. But it would appear from many unsuccessful efforts, that the properties necessary to constitute a good dairy cow, and those necessary to fit one for the shambles, in the least time and at the least expense, are very seldom united or combined in the same animal. "Years of useless effort, to unite these two irreconcilable properties, have proved that the different breeds of neat cattle have not hitherto been brought to entire perfection." We have many instances on record, in which our *native cattle* have proved themselves not only very superior milkers, as regards quantity and quality, but that when put up, they take on fat equal to the best of imported stock.

With respect to the pasture and other food adapted for cows as it regards their milk, we can only take room to remark here that the animal should be suited to the soil—and cattle ought not to be brought from superior to inferior pastures—for instances have occurred in which six cows fed on some pastures, have yielded as much milk as nine or even twelve will afford on inferior ground.

The food, of whatever kind, should be well prepared, and administered at regular intervals. On exactness in this respect a great measure of success depends. Milch cows require a full supply of the most nutritious and succulent food—and it is not only essential that it be of a good quality, but that it be of such quality as is relished by the cattle. Many dairymen pasture their cows during summer—others, the practice is becoming more general, have adopted the soiling system. In winter, stall-feeding is recommended and generally adopted. But the utmost order and regularity should be observed. The building should be well ventilated in winter as well as in summer—cleansed every day in the most perfect manner—the cows should all be curried, and have a plentiful supply of water, which if well thickened with Indian meal, will be the better.*

Some experienced and intelligent graziers and dairymen, maintain that good natural pastures are far superior to the best of roots and the artificial grasses, producing a greater yield of milk and a better flavor in the butter, than is produced from soiling. No farmer should be deterred, however, from this opinion, from feeding his dairy stock on the soiling principle, as the advantages of that over the old system are great, and may be ascertained by any one who will take the pains to promote his own interest, by making a fair and just experiment.

Much more generally depends upon the construction of the cow-house than many persons suppose. It should be perfectly dry, very airy, and comfortably warm. The greatest attention must be paid to the cleanliness of the house; and the management of the cows must in no case be confided to an inexperienced, incompetent, or unfaithful person; and no one should be employed about cattle, of any description, who possesses a bad or ungovernable temper, as cattle require kind and gentle treatment.†

Milking is a process that requires extreme care and nicety, as the manner in which it is performed is apt to diminish the quantity and impair the quality. During the summer season, cows, if well fed, should be milked three times a day—early in the morning, at noon, and just before nightfall—and nothing is of greater importance than to have the milk thoroughly drawn from the cow; not solely because that last drawn is the richest, but also because whatever portion is suffered to remain is re-absorbed in the system, and at the next milking a less quantity is yielded. This fact is accounted for on the principle that nature generates no more than is necessary to supply the waste of that taken away. Therefore, if this imperfect system is permitted, the produce of the dairy will be greatly diminished, and the cow, in the process of time, cease to yield her milk.

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* Ezekiel Rhodes, a worthy farmer of Montgomery county, and a man of great observation and penetration, says—That within one week after his sugar-beets were exhausted, the butter from his cows was reduced one-third, (within a fraction,) and that the butter he made and sold during the time his cows were fed mainly on sugar-beets, was in much higher repute than it had ever been before.

† Cows should always be treated with great gentleness, and soothed by mild usage, especially when young and ticklish, or when the paps are tender; in which last case, the udder ought to be fomented with warm water before milking, and touched with the greatest gentleness, otherwise the cow will be in danger of contracting bad habits, becoming stubborn and unruly, and retaining her milk ever after. A cow never lets down her milk pleasantly to the person she dreads or dislikes. The udder and paps should always be washed with clean water before milking; but care should be taken that none of that water be admitted into the milking pail.

The late Dr. James Anderson, whose name is intimately and honorably connected with the cause of agriculture, and who for many years was one of its brightest ornaments and ablest advocates, combining scientific knowledge with great practical experience, furnished for the Bath, west of England, Agricultural Society, a valuable paper "On the Management of the Dairy, particularly with respect to the making and curing of butter." To this day, and in all dairy countries, this paper is considered as of the highest authority; though of considerable length, it may be found published entire in the third volume of the Farmer's Cabinet, and also in the Farmer's Register for the year 1839. The following extracts will give the Doctor's views on the subject of milk. The facts set forth are very important, and ought to be deeply impressed on the minds of all who have the oversight or management of dairies. They are given by the author in the form of aphorism, that they may be the more readily adverted to, and the easier retained.

Aphorism I.—Of the milk that is drawn from any cow at one time, that which comes off at the first is always thinner and of a much worse quality than that which comes afterwards, and the richness goes on continually increasing to the very last drop that can be drawn from the udder at that time.

Among farmers in this country, the last drawn milk from the cow is termed *stroakings*, and it is well known that it is much superior in point of richness to that which is drawn at first—but few have any conception of the vast disproportion in the quality of the first and last drawn milk from the same cow, at one milking. The fact was long since ascertained by Dr. Anderson, and confirmed by many years subsequent experiments and observation, and holds good to the present day. He took a number of cups, of the same size and shape, one was filled at the beginning of the milking, and the others at regular intervals, the last being filled by the stroakings. The result was "that the cream from the last drawn from some cows, exceeded that from the first, in the proportion of *sixteen* to *one*. In other cows, however, and in particular circumstances, the disproportion was not quite so great; but in no case did I find it fall short of the rate of *eight* to *one*. Probably, upon an average of a great many cows, it might be found to run at *ten* or *twelve* to *one*."

The difference in the *quality* of the cream, however, obtained, was much greater than the difference in the *quantity*. In the first cup the cream was a thin tough film, thinner and perhaps whiter than the paper on which I write; in the last, the cream was of a thick *butyrous* consistence, and of a glowing richness of color, that no other kind of cream is ever found to possess. The difference in the quality of the *milk* that remained after the cream was separated, was perhaps still greater than either in respect to the quantity or the quality of the cream. The milk in the first cup was a thin bluish liquid, like as if a very large proportion of water had been mixed with ordinary milk; that in the last cup was of a thick consistence and yellow color, more resembling cream than milk, both in taste and appearance. From this important experiment it appears, that the person who, by bad milking of his cows, loses but a half a pint of the milk, loses in fact about as much cream as would be afforded by six or eight pints at the beginning, and loses besides, that part of the cream which alone can give richness and high flavor to his butter.

Aphorism II.—If milk be put in a dish and allowed to stand till it throws up cream, that portion of cream which rises first to the surface is richer in quality and greater in quantity, than what rises in a second equal portion of time; and the cream that rises in the second interval of time is greater in quantity and richer in quality than that which rises in a third equal space of time; and that of the third than the fourth, and so on, the cream that rises decreases in quantity, and declines in quality continually, as long as any rises to the surface.

Aphorism III.—Thick milk always throws up a smaller proportion of the cream it actually contains to the surface, than milk that is thinner, but that cream is of a richer quality; and if water be added to that thick milk it will afford a considerably greater quantity of cream than it would have done if allowed to remain pure; but its quality is at the same time greatly debased.

Aphorism IV.—Milk which is put into a bucket or other proper vessel, and carried in it to any considerable distance, so as to be much agitated and in part cooled before it be put into the milk-pans to settle for cream, never throws up as much nor so rich cream, as if the same milk had been put into the milkpans directly after it was milked.

A practice prevails among dairymen of putting all the milk of all the cows in one large vessel. This certainly is not good practice, as the produce of a large dairy may be greatly debased by the milk of one bad cow. If the milk from each cow be placed in separate pans, the farmer will be able to form a correct judgment as to the quantity and quality—and also, what is highly important, he will know which of his cows it is his interest to dispose of to the butcher, and likewise those most desirable for breeding. It should be remembered that the true value of a milker, does not consist so much in her appearance, as in the quantity and quality of the milk yielded.

When butter of a very superior quality is desired, the milk last drawn must be reserved for the purpose. It is stated by Dr. Anderson—but a difference of opinion is entertained on this point—that the best butter can only be, with economy, made in those dairies where the manufacture of cheese is the principal object. The reason is obvious. The stroakings, or the cream which rises during the three or four first hours, (which is generally conceded to be the richest portion,) is taken for the butter, and the remainder converted into cheese, with nearly as great advantage as the new milk itself.

A correspondent of the Cultivator, Mr. **James Smealle**, in noticing the difference that exists in butter, says, "some butter is very fine, while another parcel is unfit for the table, yet both the good and the bad are obtained from milk possessing exactly the same properties. It is evident that it is not to the milk, but to the *management* of it, that we must look for the cause of that great diversity of quality existing in butter."

The properties of a good milk-room are, that it be cool in summer and moderately warm in winter, so as to preserve throughout the year a temperature of from 50° to 55°; for this purpose a stone wall will be necessary in winter. A good thermometer will also be found an indispensible article. It should have its windows to the north—well ventilated, perfectly dry, sweet and clean; and no putrid substances should be permitted to remain for the shortest space of time in its neighborhood—every thing in and around the building must be in perfect order, and the most scrupulous regard to cleanliness be observed. The windows should be formed of gauze-cloth, which will exclude flies, but admit the air, and protected from mice and accidents by a grating of wire. Glass sashes are to be provided for winter.

The work-room, in which the different manual operations are to be performed, is to be fitted up with a boiler for heating both water and milk; and this room in ordinary cases should be sufficiently large for performing all the necessary in-door operations of the dairy. But where a farm is exclusively, almost, devoted to this business, or the dairy, on a mixed farm, is unusually large, separate apartments should be provided for the different processes of churning, cheese-making, and cleansing the vessels.

The store-room is designed as a repository of the produce of the dairy, butter or cheese, or both, when made, where they may be kept securely until it may be advisable to remove them. Without being too much heated or lighted, it should possess a certain degree of warmth—it may be placed where most convenient.

The utensils necessary for a dairy are, 1. Milking-pails formed of wood. 2. Sieves of hair or wire-gauze for straining the milk and retaining its impurities. 3. Vessels for holding the milk until the cream rises upon the surface, and a vessel for containing the cream. 4. Flat dishes of willow, ivory or horn, for the purpose of skimming the cream from the surface of the milk. 5. A churn. 6. A wooden vat or tub in which the milk is placed when the curd is coagulated. 7. A cheese-knife, for the purpose of cutting or breaking the coagulated curd, that the whey may be separated. 8. A vessel perforated with holes, in which the curd may be placed, that it may be broken, and the serous matter further separated. 9. Wooden vessels, with perforated side and bottom, in which the curd is placed for being compressed. 10. A cheese press. These articles should, of course, be of the best construction.

Various materials are used in the construction of milk dishes and other dairy utensils. The employment of leaden vessels, in any way, should be wholly discarded. Cast iron, smoothed within and coated with tin is recommended by Professor Low, who says, that cast iron and zinc are superior to the more common material, wood—as they are more easily kept clean, and sooner cooled, which contributes to the more ready separation of the cream. If the traces of arsenic found in zinc can be neutralized, then would we recommend it for general use; but if not, we would adhere to wooden vessels properly constructed, as being free from all the serious objections raised against those formed of metal. They can, with proper attention and labor, be keept sweet, clean, and free from every taint.

There are a great variety of churns of different modes of construction, the most common of which is the ancient implement, moved by hand and called the plunge-churn. The form of this domestic instrument is every where known. It consists of a cylindrical vessel of wood placed upright; it acts by means of a long handle furnished at the inner end with a perforated board, which nearly fits the cylinder; this is worked up and down by the dairymaid, which agitates the milk until the butter is separated. This is considered the most efficient, but tedious and laborious process, and will answer only when the quantity made is small. The barrel-churn, and others of improved construction, is recommended. A critical examination of the different kinds should be had before purchasing—and the dairyman should fully understand the principles upon which his patent or improved churn is constructed.

Butter may be obtained either by separating the cream from the milk and then churning it, or by churning the milk and cream together. By the first method, the best butter is obtained—by the second, the largest quantity. It is a point of practice with many Pennsylvania farmers to cool the milk as soon as drawn from the cows, by reducing it to the temperature of the interior of the milk-house, which in summer scarcely exceeds 50°. By this means, the milk remains sweet much longer than it otherwise would, and sufficient time is allowed for it to throw up all the cream, so there is no loss.

If it is concluded to have the butter produced from cream, the cream from each successive milking is put into a vessel until a sufficient quantity shall be collected; when the quantity is obtained, and before the cream arrives at too great a degree of acidity, it is put into the churn, in which, after being regularly agitated for about the space of an hour, the butter will be separated. It appears in the shape of small kernels, which are united by the pressure of the dasher against the bottom of the churn, and soon forms a solid mass of butter, which is then removed, carefully worked and kneaded in cold water, until the milk is entirely separated, which is known by the water coming off pure and clear. "The best temperature of the cream for the separation of the butter, appears to be about 60°—in cold weather it may be raised somewhat higher by the addition of hot water."

It is frequently the case, that butter when taken from the churn, is worked too much; that is, the process of working by the hand, beating and pressing it down with a cloth, in order that the remaining milk may be absorbed, is carried to excess. The less it is kneaded or beaten the better; for the more it is worked, the more tough and gluey it will become. When the butter is used fresh, a small portion of the best and purest salt will be sufficient.

But by far the greatest portion of butter is made at a distance from large towns, which is salted down in kegs, tubs and firkins, containing generally from fifty-six to one hundred pounds. ☞ The quality of the salt used is of great importance—if it be pure, the butter will retain its flavor for a long time—but when it is impure, and contains bitter and deliquescent salts, the butter will soon become rancid. The Germans are very particular on this point. They use a kind of salt made by slow evaporation, and perfectly chrystallized. The salt is intimately mixed with the butter. From three to five pounds are sufficient for a firkin of fifty-six pounds.*

In packing or salting down butter the greatest possible degree of caution, nicety and exactness is to be observed. The butter having been formed by the process of churning, and perferctly cleansed from all particles of milk, is supposed to be ready to undergo the process of salting and packing. The vessel into which the butter is to be placed, after having been rendered as clean and sweet as possible, must be well rubbed all over in the inside with common salt—a little melted butter should be run into the cavity between the bottom and the sides, at their joining, all round, so as to fill it, and make it every where flush within the bottom and sides. It is then fit to receive the butter.

For the preservation of butter, even in the warmest climate, Dr. Anderson found, from some years experience, that the following named composition—the properties of which we believe were discovered by his amiable lady—was far preferable to salt alone, as it not only preserves the butter more effectually from all taint of rancidity, but makes it also look better, and taste sweeter, richer, and more marrowy, than portions of the same butter cured with common salt. *Composition.* Take of sugar one part, of nitre one part, and of the best Spanish great salt (or rock salt) two parts. Beat the whole into a fine powder, mix them well together, and put them by for use. The Doctor continues:

> Of this composition one ounce should be put to every sixteen ounces of butter; mix this salt thoroughly with the butter as soon as it has been freed from the milk, and put it, without loss of time, down into the vessel prepared to receive it, pressing it so close as to leave no air holes, or any kind of cavities within it. Smooth the surface, and if you expect that it will be above a day or two before you can add more, cover it close up with a piece of clean linen, and above that a piece of wetted parchment, or, for want of that, fine linen that has been dipped in melted butter, that is exactly fitted to the edges of the vessel all round, so as to exclude the air as much as possible, without the assistance of any watery

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* The following mixture has been found superior to salt alone for curing butter: half an ounce of dry salt, pounded fine, two drachms of sugar, and two drachms of saltpetre, for every pound of butter.

brine; when more butter is to be added, these coverings are to be taken off, and the butter applied close above the former, pressing it down and smoothing it as before, and so on till the vessel be full. When it is quite full, let the two covers be spread over it with the greatest care, and let a little melted butter be poured all round the edges, so as to fill up every cranny, and effectually exclude the air. A little salt may be then strewed over the whole, and the cover be firmly fixed down to remain close shut till it be opened for use. If all this be carefully done, the butter may be kept perfectly sound in this climate for many years. How many years I cannot tell; but I have seen it two years old, and in every respect as sweet and sound as when it was only a month old.

It deserves to be remarked, that butter cured in this manner does not taste well till it has stood at least a fortnight after being salted; but after that period is elapsed, it eats with a rich marrowy taste that no other butter ever acquires; and it tastes so little of salt, that a person who has been accustomed to eat butter cured with common salt only, would not imagine it had got one-fourth part of the salt that would be necessary to preserve it.

Judge BUEL says—

Believing that butter may be kept sweet and good, in our climate, almost any length of time, if properly manufactured, and well taken care of, in order to test the validity of this opinion, we had two pots put down, one in June, and the other in August, 1834, more than twenty months ago; and on probing them with a tryer, while penning this article, the butter is found perfectly sweet, and seems to retain most of its original flavor and freshness.

In the manufacturing process, *no water is permitted to come in contact with the cream or butter*—because it is believed that water, and particularly soft water, dissipates much of the fine flavor that gives to butter its high value. The Orange county dairywomen say, "give us good hard water and we will make good butter;" for the reason, probably, that it abstracts less of the aroma from the butter than soft water. The temperature of the cream may be regulated by cold or hot water put into a tub, in which the churn may be plunged. If the cream is clean, it needs no washing; and if the butter is dirty, water will never clean it.

Nothing but good well pulverized salt is used in preserving the butter; this is *all* mixed, and *all* dissolved, in the mass, before the butter has its second, thorough and final working with the butter ladle, and which is not finished till *all* the buttermilk is expelled.

To avoid all taint from the butter vessels, and the better to exclude it from the air, which soon injures it, the butter is packed close in clean stone jars, and when nearly filled, is covered with a strong brine, rendered pure by previous boiling, skimming and settling. In twenty months this brine has been twice renewed, on the appearance of a film upon the surface of the old pickle. To preserve butter, air and water, and heat above 65 or 70 degrees are to be guarded against as much as possible. The brine upon the surface does not penetrate the mass, nor while sweet taint it, but thoroughly excludes the air.

The making of butter in winter is a very nice process, and at times attended with difficulty. On the farm of Dr. JONES, and in various sections of Virginia, the following process is adopted. Mrs. JONES prepares her cream for churning by heating the milk after it has stood from twelve to twenty-four hours, by placing it over coals the evening before churning. When it has nearly attained the boiling point, it is set by till morning. The cream is then skimmed off, and churned by stirring in an earthen vessel. The butter is delicately white and clear in its complexion, firm and fine flavored.—*Complete Farmer.*

An interesting and valuable paper on the making of butter in cold weather, by the Rev. W. Allen, states the results of several trials, by which it appears that butter may be obtained in the coldest weather with as much ease as in the most favorable season of the year, if the cream, at the commencement of the churning, is brought to the temperature of 75°.

PROCESS OF CHEESE-MAKING.

The production of cheese includes the making of rennet—the selection of a coloring matter—the setting of the curd—and the management of the cheese in the press. Cheese consists of the caseous matter of milk united to a certain portion of the oily or creamy part. This oily portion adds to the flavor and richness of the cheese, and hence when good cheese is wanted, the cream should not be separated. Cheese, however, is made from milk from which the cream has been removed—it is then termed skimmed-milk cheese, and is of an inferior order.

In the making of cheese, there are certain principles which are essential, but slight variations in the process produce cheeses of very different qualities—and although the most important circumstance is the quality of the pasture on which the cows are fed, yet much depends on the mode in which the different stages of the fabrication are managed—hence the great superiority of the cheeses of particular districts or dairies over those of others, without any apparent difference in the pasture.* By skill and great attention excellent cheeses are made in places where the pastures are not considered so well adapted to produce milk of a proper quality; and where cows are chiefly kept in stalls, and fed with a variety of natural and artificial grasses, roots and vegetables, superior cheese is often made.

The season best adapted for cheese-making so as to secure for it the greatest degree of richness, generally extends from the first of May until the middle of October. But in most dairies the fabrication of cheese is continued throughout the entire year. The prevailing opinion that good cheese cannot be made in winter, is erroneous. The cows should be well fed, and every possible degree of attention devoted to the making of the cheese—these, with a perfect knowledge of the business, we conceive to be all the requisites to ensure good cheese in the winter season. Milk, it is said, abounds most in caseous matter during the spring, and with the butyraceous in summer and autumn. Cheese may be made from the curd which has been formed by the coagulation of the milk when it turns sour; but, when thus obtained, it is hard and ill-flavored—means have therefore been found to curdle it with "rennet."

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* The cheese manufactured at the dairy of the late Judge Capner, of Flemington, New Jersey, was justly celebrated and eagerly sought after throughout the Union. This high reputation was acquired by *superior management* in its fabrication, for the pasture grounds generally, wherever attended to, in that region, were fully equal to those occupied by Mr. C., and in some parts of old Hunterdon, we believe the pasture grounds were better, and naturally more fertile.

The preparation of the rennet, as it is denominated, is a most important part of the process of cheese-making. What is termed rennet is nothing more than the stomach of an animal, in which the gastric juices are preserved by salt—the best is the stomach of a sucking calf. This juice rapidly coagulates the milk as the calf sucks; and the only difficulty is in collecting and keeping it from putrefaction, which begins from the instant the stomach is taken from the calf. The following may be considered the simplest, and perhaps the best method of preservation.

As soon as a sucking calf is killed, the stomach should be taken out, and if the calf has sucked lately, it is all the better. The outer skin should be well scraped, and all fat and useless membranes removed. It is only the inner coat which must be preserved. The coagulated milk should be taken out and examined, and any substance beside curd found in it should be carefully removed. The serum left in it should be pressed out with a cloth. It should then be replaced in the stomach with a large quantity of the best salt. Some add a little alum and sal prunella—others, various herbs and spices, with a view of giving the cheese a peculiar flavor, but the plain simple salting is sufficient. The skins or vells, as they are called, are then put into a pan and covered with a saturated solution of salt, in which they are soaked for some hours—but there must be no more liquor than will moisten the vells. They are afterwards hung up to dry, a piece of light flat wood being put crosswise into each to stretch them out. They should be perfectly dried and look like parchment. In this state they may be kept for any length of time, and are at all times ready for use. In some places, at the time of making cheese, a piece of a vell is cut off and soaked for some hours in water or whey, and the whole is added to the warm milk. In other places, pieces of vell are put into a linen bag and soaked in warm water, until the water has acquired sufficient strength, which is proved by trying a portion of it in warm milk.

There are a variety of modes for preparing and using the rennet. Professor Low says, that when prepared for use, it is to be cut into small pieces and put into a jar, with a handful or two of salt. Water, which had been previously boiled and cooled again, is then poured upon it, and allowed to remain for two or three days. It is then drawn off, and a second infusion made, but with a smaller quantity of water. This, also, remains a few days, and being withdrawn, the two liquors are mixed together, strained through a cloth, and put into bottles to be used when required. This, we presume, is the approved Scotch method.

Experience is necessary to determine the quantity of rennet necessary to coagulate a given quantity of milk, as much necessarily depends upon its strength. Throughout the whole process of preparing and preserving rennet, too much attention cannot be paid to its cleanliness and sweetness—and if it be used after it has become foul or tainted, the cheese will become invariably affected by it; and will very often be rendered thereby unfit for use.

Muriatic acid is used in very small quantities as a substitute for rennet, on the continent of Europe, and in other places. It is the use of this article which gives to the Dutch-cheese that pungent relish which induces so many persons to prefer it.

Coloring matter.—As cheese in its native state, that is, such as is well manufactured, being put together in proper time, the milk being of a proper degree of warmth, and in all other respects properly pressed, salted, and dried, is uniformly of a bright yellow cast, the idea of excellence is generally attached to cheese of such a color. Hence it is, says **Loudon**, that it has become necessary for the dairyman who would dispose of his cheese to advantage, to impart a light yellow orange color to it by artificial means.*

For imparting a color to cheese the *Spanish arnotto* is unquestionably the best of all ingredients. It is a preparation of the *roucou*, (*Bixa orellana*,) which grows in the United States. The red pulp which cover the seeds of this tree, is suspended in hot water, and allowed to subside—and when dry, is formed into cakes or balls, which are further set aside until they become dry and firm. When *genuine*, one ounce of this substance will be sufficient to color one hundred pounds of cheese. The usual way of applying it is to dip a piece of the requisite size and weight in a bowl of milk, and then rub it on a smooth stone until the milk assumes a deep red color. This infusion is then to be added to milk of which cheese is intended to be made. in such quantity as will impart to the whole a bright orange color, which will become the deeper in proportion to the age of the cheese. The mixing of the arnotto in no respect affects either its taste or smell.

In Cheshire, England, a somewhat different practice prevails. It is usual when the coloring matter is wanted to tie up about as much as is deemed sufficient in a linen rag, and placing it in half a pint of warm water, let it stand over night. In the morning, immediately before the milk is coagulated, the whole of this infusion is mixed with it in the cheese-tub, and the rag is dipped in the milk, and rubbed on the palm of the hand until all the coloring matter is completely extracted.

A very simple method is thus recommended. Take a piece about the size of a hazlenut, put it into a pint of milk the night before you intend to make cheese, and it will dissolve. Add it to the milk at the time the rennet is put in. This quantity will color a cheese of twenty pounds weight.—**Parkinson.**

In making cheese the milk is put into a large tub, and this, as soon after being obtained from the cows as possible. If there is a sufficient number of cows on the farm to produce one cheese to a milking, the process is performed immediately. The milk, after being strained through a sieve, is put into a vat, and while yet warm, a table-spoonful or two of the rennet (or a sufficiency) is mixed with it, after which the coagulation soon takes place.

But if there are not a sufficient number of cows to make a cheese each time they are milked, the milk as it is brought from the cows, is put into milk vessels, until as much is collected as will form a cheese. When the cheese is ready to be made, the cream is skimmed off, and as much of the milk is heated separately, as, when added to the mass again, will raise it to about 90°. The cream which has been separated is then either mixed with this heated milk, and so liquefied and dissolved in it, or it is not incorporated with the general mass until the heated milk has been added.

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* Marigolds boiled in milk, are also used for coloring cheese—to which they also impart a pleasant flavor. In winter, carrots scraped and boiled in milk, afterwards strained, will produce a richer color; but they should be used with great moderation on account of their taste.

The curd being fully formed, is cut in various directions with the cheese-knife, so as to permit the whey to exude; the whey is then taken out in flat dishes, the curd at the same time undergoing a gentle pressure. By the operation of the cheese-knife, the curd is then cut into small pieces, put into a sieve or vat with holes, and then repeatedly cut, pressed by the hand and broken, until it ceases to give off any serous matter. It is last of all cut very fine by the cheese-knife, and a quantity of salt, in the proportion of half an ounce to a pound of cheese, being mixed with it, it is wrapped in a piece of cloth, and then placed in a small wooden vessel, with circular holes at the sides and bottom, and placed in the cheese-press. This is the process of cheese making, as detailed in the Elements of Agriculture. Some others, however, recommend that when the curd is sufficiently drained, and broken with the hand as small as possible, that the salt, which should be of the most superior kind, be scattered over the curd, and intimately mixed with it; the proportion, however, has not been correctly ascertained, and is regulated by experience.

The pressing process is one of great nicety, as the period for which the cheese should remain in the press is, in a great measure, dependent upon the nature of the cheese, and the degree of previous manipulation which it had undergone. In some of the finer and richer cheeses, the pressure is very slight, and in some few cases, the cheese press is entirely dispensed with. But in ordinary cases, the cheese being wrapped in a cloth, and put into its vat with a board above it to fit the vat, remains in the press from one to two hours. It is then taken out, broken again by the hand, wrapped in a fresh cloth, and replaced in the cheese-vat; and sometimes it is not broken but merely reversed. It may then be taken out every five or six hours and the cloth changed. After being pressed in this manner for two or three days, the operation will be complete. The cheese may then be kept in a warm place until dry, and ultimately placed in the store-room for preservation.

The management of some is, when the making and salting is completed, a cloth is to be spread over the cheese vat, the broken curd is to be neatly packed into it, the whole well covered by a clean cloth. A smooth round board, as before described, is then laid over the vat, the vat being usually filled to the height of about an inch above the brine, the object of which is to prevent the curd sinking below it, when the whey is squeezed out. It is then placed in the press, and as it is essential that every particle of whey should be expressed, iron skewers, about eighteen inches in length, prepared for the purpose, are thrust into the cheese through the holes in the lower part of the vat, by which means the passage of the whey is greatly facilitated. In two hours the cheese is taken out, and immediately placed in a vessel of warm or hot whey, (not boiling,) where it remains for an hour or two for the purpose of hardening the surface or skin of the cheese.

When the cheese has remained for a sufficient time in the warm whey, it is removed, carefully wiped until dry with a towel, and when cold, neatly enveloped in a fine cloth, and again submitted to the pressing process for six or eight hours. It is now turned a second time, taken to the salting-room, where it is rubbed on each side with salt—after which it is wrapped in a dry cloth of a much finer texture than either of the cloths before used, and is again pressed for twelve or fourteen hours. If any edges remain they are paired off; the cheese is then placed upon a cheese shelf, where it is to be turned every day. In the salting-room, cheese, says PARKINSON, should be kept warm until it has had a sweat, or has become regularly dry or somewhat stiff—as it is a proper degree of warmth that ripens cheese, improves its color, and causes it when cut to have a flaxy appearance, which is the surest sign of superior excellence.

The management of the cheese-room requires much care and attention. After the cheeses have passed through the different processes, and the salting and drying are completed, they are deposited in the cheese or store-room, which should be airy and dry. The hard and soft cheeses ought not to be kept in the same room. The dairyman should bear in mind that there is no possible remedy for the defects of previous management; for if the rennet be impure, the whey not wholly expressed, or the salting imperfectly or insufficiently performed, the cheese will prove of inferior quality. When a cheese has a disposition to heave or swell, or run out at the sides, it may be regarded as an indication that the whey had been imperfectly separated.*

New cheese to fit it for market requires to be well dried; when taken out of the mould they are to be laid on a shelf, and the surface of each alternately exposed to the air. This laborious operation was formerly performed by hand, but machines answering every desirable purpose have been invented, and may be obtained by those requiring them.

Great variations take place in the manner of performing the operations of the cheese manufacture—and certain districts are distinguished by their peculiarities of practice. The richness and flavor of cheese, very much depend upon the quantity of cream which the milk contains. In some places, most celebrated for rich cheese, the cream of one milking is skimmed off and mixed with the entire milk of the subsequent milking. In this way the milk which produces cheese has its own cream and that also of a previous milking.

We learn from the Transactions of the Highland Agricultural Society of Scotland, that the flavor of an old cheese may be communicated to a new one of whatever species, by the insertion of some portions being intermixed with it. This is done by extracting small pieces with the sample-scoop from each cheese, and interchanging them, by which means the new one, if well covered up from the air, will, in a few weeks, become thoroughly impregnated with the mould, and with a flavor hardly to be distinguished from the old one. The cheeses selected must be dry, and the blue mould should be free from any portion of a more decayed appearance.

To enumerate all the different varieties or sorts of cheese, and other preparations made from milk, would form quite a catalogue; it is an article in universal esteem; but there are different kinds in almost every district, according to the mode of its preparation. Having already occupied a large space of the work with remarks relative to the process of cheese making, we have only room to refer briefly to a few of the foreign cheeses of superior excellence.

The *Cheshire cheese* is in the highest repute, and eagerly sought after. The making of this cheese is carried to the greatest perfection—it is made from the whole of the milk and cream, the morning's milk being mixed with that of the preceding evening, previously warmed. The greatest pains are taken to extract every particle of whey.

The *Stilton cheese*, proverbial for its richness and flavor, is made by putting the night's cream, without any portion of the milk, to the milk of the following morning, with the rennet; but those who wish to make it very fine, add a still greater quantity of cream, and of course the richness of the cheese depends upon the amount which is used. When the curd is come it is not broken, as is usual with other cheese, but is taken out whole and put into a sieve to drain gradually, when it is pressed with weights until entirely freed from the whey; when it becomes dry by the process of pressing, it is put, with a clean cloth, into a vat or box made to fit it, the outer coat being first well salted. When it has acquired firmness enough to be removed from this mould, it is to be placed on a dry board, tightly bound about by a fine cloth, which is to be changed daily, to prevent cracks; but when this danger ceases, the use of the cloth is dispensed with, and the cheese requires no further attention or care than daily turning upside down and brushed for two or three months. It generally remains two years before being brought to market.

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* In order to prevent or stop this heaving, the cheese must be laid in a moderately cool and dry place, and be turned regularly every day. It should be pricked on both sides, in several places, particularly where it is most elevated, by thrusting a skewer into it, by which a passage is given to the confined air. This pricking, with a cheese-skewer or awl, which should be repeated as often as necessary, will not altogether prevent the swelling; yet, by giving vent to the confined air, it renders it less considerable—and the cavities of the cheese will neither be so disagreeable, nor consequently so unsightly or unpleasant to the eye. LOUDON say that *hard and spoiled cheese may be restored* as follows: Take four ounces of pearl ash and pour sweet white wine over it, until the mixture ceases to effervesce. Filter the solution, dip into it clean linen cloths, cover the cheese with them, and put the whole into a cool place or dry cellar. Repeat this process every day, at the same time turning the cheese, and if necessary, continue it for several weeks. Thus the hardest and most insipid cheese, it is affirmed, has frequently recovered its former flavor.

Of the *Parmesan cheese* almost every person has some knowledge; it is made in various parts of Lombardy, and particularly in the Dutchy of Parma; it is prepared much in the same manner as the Cheshire, and the best American cheeses. It is, however, made of skim-milk, the curd hardened by heat, by being placed in a suitable vessel over a moderate fire, well salted, thoroughly pressed, dried, long kept, and rich in flavor from the rich herbage of the meadows of the Po, along the borders of which the cows are pastured.

Soft and rich cheeses are not intended to be kept long—hard and dry cheeses are adapted to be kept and stored for years. Of the first kind are all cream cheeses, and those soft cheeses which are sold as soon as made, and which if kept too long become soft and putrid. The Cheshire, and similar cheeses, are intended for longer keeping—and cheeses made in very many American dairies, have been known to keep in the most perfect manner for years. The great point is to have them perfectly cleared of whey, and properly and sufficiently salted.

[From the Albany Cultivator, September, 1845.]

CONNECTICUT CHEESE DAIRIES.

In our late excursion through Connecticut, we were glad to find satisfactory evidence that the character of that State for the manufacture of good cheese, is still maintained. The two principal cheese neighborhoods which we visited were Goshen and Winchester. The first of these towns became famous for its cheese at an earlier period than any other section of the country, but though the place still holds a prominent rank in this respect, we are inclined to think, from what we saw and heard, that for *general* reputation, "the sceptre has departed from" Goshen, and is now held by Winchester.

From Mr. A. Miles, of Goshen, a large dealer in cheese, we obtained some facts in regard to the quantity annually made there. The average quantity exported from the town, is about 500,000 pounds. The quantity of butter sold, is small, being only about 40,000 pounds per year. Cheese has fallen much in price within a few years, owing to the increased quantity thrown into market. It sells this season, while new, at five cents per pound—at home or within the town. The average quantity made per cow is not known, but may be estimated at 300 to 350 lbs. Some good dairies make much more. Mr. Lawton sold last year an average of 403 lbs. per cow, and with what he kept for his own use, probably made 425 lbs. per cow.

Mr. Lewis M. Norton, of Goshen, was the first manufacturer of what is called *Pine-apple* cheese, in America. He commenced making this article in 1808. He had at this time no knowledge of the mode in which it received its peculiar form and qualities. He saw some which came from England, and set himself to work to imitate it. His first trial succeeded so well that he was encouraged to persevere, and he has continued to progress, until at this time, he has so perfected the whole process, from the "running up" of the curd, to the sale of the cheese, as to entirely distance all competition.

Mr. Norton is this year using the curd from ninety cows, for making pine apple cheese. The principal portion of this curd is bought of his neighbors, for which he pays them the same price per pound that common new milk cheese brings, which is five cents this season; so that those who sell him their curd, save all the labor of pressing and curing their cheese, besides gaining considerable from the greater weight of the cured.

The curd is kept for twenty-four hours before it is made into cheese. The advantage of this, is supposed by Mr. Norton to be, that a degree of fermentation takes place, which being checked at a critical time, by the cutting of the curd, preparatory to its being formed into cheese, is not renewed after it comes from the press; thus preventing the defect of the cheese being hoven or blown.

The curd is rapidly cut into pieces of not more than a fourth of an inch square, with a machine invented by Albert Loomis, Torringford, Ct., which Mr. N. prefers to any curd-cutter he has seen. After being cut, the curd is put in a cheese cloth, placed in warm water, and the temperature gradually raised by pouring in water that is still warmer, till it reaches 105 degrees, by the thermometer. This does not *scald* the curd, which according to the practice of the best cheese-makers in England and in this country, is, we think, discountenanced. The curd is next cooled, by adding cold water, to the temperature of 88 degrees, when the whole of the water is drawn from the vat, and the curd weighed, and salted with the finest kind of table salt—four ounces of salt to ten pounds of curd—and after being well stirred is put in the press, where it remains twenty-four hours, or a longer time, as is convenient, as it takes no hurt by remaining forty-eight hours. The curd is weighed immediately over the tub, being drawn up by a pulley, and when this is done, is again lowered into the tub, where it is salted.

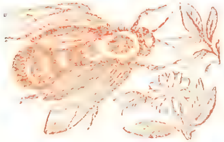
The cheeses are pressed in moulds, made of sound blocks of oak timber, about twenty inches long and ten inches square. They are sawed lengthwise through the middle, and each half is carved or worked out so as to give the general shape of a pine-apple—one half in each part. From the cavity to the upper end of the block, a groove is cut in each part, which, when the parts are placed together, makes a round channel of about two and a half inches in diameter, for passing the curd into the mould. When the two parts of the block are put together in such a manner that the cavities match each other, and are strongly keyed into a frame, they form the mould for pressing the curd. The pressure is applied by means of a screw, operating on an upright, round piece of wood, which fits the channel in the block, and as it is forced down compresses the curd in the mould. The presses are very compact and strong, and appear to answer the purpose well. He has sixty eight of them, and makes twenty-eight cheeses per day, weighing when dried five pounds each. When the cheeses are taken from the press, they are trimmed, and then placed in nets and hung in water of the temperature of 130 degrees. This is to soften the outside, that it may receive the desired impression from the net, which is done by taking them from the water while enveloped in the nets, placing them in a frame and straining the nets tightly over them by means of screws. This indents the threads of the net into the cheese in such a manner as to give them the external appearance of the fruit from which they are named. After this operation the cheeses are hung up in the nets from three to five weeks, for the outside to harden, and are then set on shelves having suitable hollows or concavities for the cheeses to rest on. In the centre of each concavity, a hole two inches in diameter is cut through the shelf, the more freely to admit air to the cheese, and to allow any liquid which may come from it, to run off. The nets used for the cheese are made of three-threaded flax twine, and the manufacture of them costs, exclusive of the material, about 5 cts. each. They will last three or four years.

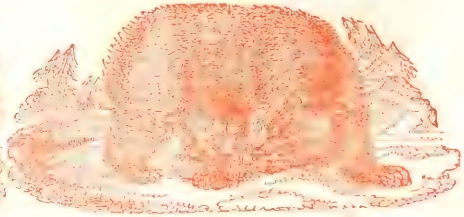
Mr. Norton sells his cheeese in New-York, Baltimore, and other southern cities. It usually nets him about ten cents per pound, after deducting commissions. How much greater are the actual profits derived from this kind of cheese than are obtained from other kinds, we cannot tell. Mr. Norton has evidently incurred great expense in his fixtures, and in the time and study he has spent in bringing the manufacture of the article to such complete perfection, and this ought, in justice, to secure him some corresponding advantage. He, however, makes no secret of any of the discoveries or improvements which his protracted and indefatigable labors have effected; but with a highly commendable liberality, freely permits the most minute examination of his systematic operations.

At Winchester, we were obligingly furnished with many facts in regard to dairying and other agricultural branches, by Messrs. S. & L. Hurlbut. These gentlemen purchase yearly 500,000 pounds of cheese, and are perhaps more widely known, from their long experience as dealers in this article, than any other men in the country. Mr. L. Hurlbut took us to several of the noted dairy farmers, among whom was Mr. Norris Coe, of Winchester, whose cheese is considered of the very nicest quality, and commands a quick sale in the market, at as high a price as is brought by any of the choice kinds of imported cheese. He usually obtains from sixteen to eighteen cents per pound, by the quantity, and it retails in New-York and the southern cities, at from twenty to twenty-five cents per pound.

We are unable to give the particulars of Mr. Coe's mode of making cheese. He thinks its superior excellence is attributable to peculiar management, which, being the result of a discovery of his own, he feels warranted in not divulging to the public, for the present. We, however, saw the cheese in all its stages, from the curd just ready for the press, to that which was two years old. Some of the latter we tasted, and must acknowledge that it was superior to almost any other we have met with.

We noticed here that everything pertaining to the dairy department, betokened the practice of uncommon neatness. The cheese-room, instead of emitting a rank, unpleasant odor, as is in many cases observable the moment the door is opened, was so sweet and agreeable that we were prompted to ask whether spices had not been used there, but were assured that nothing of the kind had been brought into the apartment. Great care is also taken to keep the cheese in a cool and even temperature. So much attention is paid to this particular, that a perfectly dark room is constructed in the centre of another room, into which the cheese is placed as soon as it becomes sufficiently dry, and is there kept till sold. The cheeses weigh when dried, about eight pounds each.





* * * * * * *

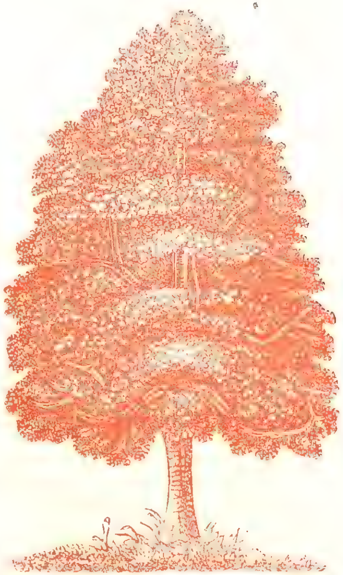
A HOME upon the hills,—
Among the trees - where flocks recline
And the pure dew of heaven distils;
Where grateful breezes fan the cheek
And living blossoms scent the air;
Where vale and hill and streamlet speak
And the Creator's love declare.

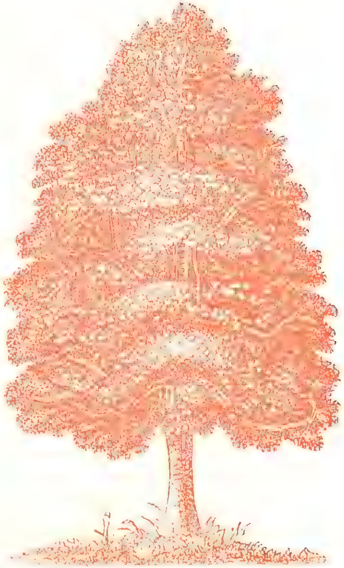
I feel at home when I can stray
In sunny glens and dreamy woods,
And see the rippling streams that play
Amid the lonely solitudes :—
I love to linger all alone,
And list the music of the breeze;
As oft in sweet and mournful tones
It plays among the nodding trees.

A life among the hills for me,
'Tis all, my God, I ask of thee,
That I may in thy sunshine bask,
With skies so pure and winds so free:
Where, night and morning, I can feel
A peace within—a love for all—
With not a care my joys to steal,
Till thou shalt for my spirit call."

SOME FEATURES OF "LONGWOOD," FAYETTE COUNTY, PA.

"OUR" MOUNTAIN HOME.





THE SUGAR MAPLE.

The sugar-maple is one of the innumerable marvels of the American forest, extending over a vast tract of country, from the 36th to the 48th degree of latitude, and in longitude half the width of the continent. No tree, with the exception of perhaps the oak and pine, has obtained a more extensive and just celebrity than the sugar-maple. The extraordinary neatness of its appearance, and the beauty of its foliage, which in summer is of the liveliest green, and in autumn assumes the richest and most glowing red, are abundantly sufficient to recommend it as a beautiful ornament in our gardens and avenues.

The branches of the sugar-maple exhibit great regularity, without stiffness, and are so arranged, that their usual outline is an elegant oval. The bark is remarkably smooth. It is a tree of tolerably quick growth—bears transplanting very well—and will grow on almost any soil. The most reckless prodigality has been manifested in the destruction of this valuable tree ; in very many sections of our country, whole groves have been felled for no other purpose than the *ashes* obtained from the burning of the trees. It is stated, on good authority, (1834,) that three-fourths of the pot and pearl ashes made in this country, and which forms so important an article of export from the northern states, is manufactured from the ashes of the sugar-maple. But this destructive system, is now, in a great measure, checked; and it has become a matter of serious importance to the farmers residing within the limits of its growth, to perpetuate and extend it.

This can be easily accomplished. They may be set out as ornamental and shade trees, around the farm-house, along the avenues, and in clusters in fields where shade is occasionally required; or, the farmer may set apart three, four, or more acres of land for a sugar orchard. The trees may be planted in rows, ten feet apart; and the same interval of ten feet between the rows. This gives four hundred and sixteen trees to an acre. The trees may be procured in abundance in any forest where the sugar-maple grows spontaneously. Those who plant *now*, will generally plant for posterity; but there are many young farmers, who, if they would address themselves to it immediately, would probably reap some benefit from such a plantation in their own time, and the advantages that would result to posterity would be very great. Samuel M. Hopkins, Esq., President of the Agricultural Society of Gennesee county, New York, says, and he cites a case in point, that a person, after attaining the age of manhood, may raise, even from the seed or sucker, an orchard of maples, from which sugar may be made twenty years or more, within the possible duration of his life.

Mr. Hopkins states that young maples, taken up in the woods and transplanted, may probably be tapped without injury in from ten to fifteen years. He is of opinion, that forty trees, of the largest growth—that is, one for every four rods of ground—are sufficient for an acre, though he does not object to eighty, or even double that number. The trees will injure the land very little, if any, either for pasturage or meadow, till they themselves become productive—and very trifling afterward, provided the trees are not set too close.

The rapidity of the growth of young trees when transplanted, depends very essentially on the manner of performing that operation. The greater the depth and superficial extent to which the ground is loosened, round where a young plant is to be set, the more rapid will be its growth. Let, for instance, a young tree be set in a hole only eighteen inches diameter, and a foot in depth—and let another, in all respects similar, be set in a space six feet wide and two feet deep, and the latter will, for many succeeding years, grow with double the rapidity of the former. In order, therefore, to give the young maple a rapid start, so as to have them soon in a condition to afford large supplies of sap, due attention must be paid to this particular. Let the spaces for the trees be dug a foot in depth and five feet in diameter, and then spade, prong, or loosen the bottom of each hole, to the depth of about a foot, before the young trees are set in.

In addition to planting maples in grounds intended as permanent pasture or meadow land, each side of the highway leading through any farm might be profitably occupied and adorned with these trees, set at the distance of about every two rods. Suppose, also, that the farm-house were placed in a spacious court-yard—occupying an acre in extent—and this planted with a suitable number of this most beautiful and ornamental tree, could any thing confer more of an air of pleasantness and elegance to the mansion. Every farmer might, in this way, stock his lands with a permanent growth that would in time afford him an abundant supply of sugar—plentiful additions of fuel—and eminently serve as an embellishment to his domain.

There is on almost every hill farm, some place favorable to the growth of a maple orchard—some rocky spot, yielding but little grass, and impervious to the plough. Such spots may be favorably chosen for the growth of a maple orchard—and whether the increase be used for the manufacturing of sugar and molasses, or for timber or fuel, the proprietor will find a profit better than money at interest in the growth of this beautiful tree, which will spontaneously propagate itself in various positions. The second growth is very rapid, becoming of a proper size, in many instances, of producing sugar in ten to fifteen years; the sap of the second growth having been found to yield a larger proportion of saccharine than the original forest trees. As an article of fuel, its wood equals the solid hickory.

The increased consumption of sugar within the last century, is really astonishing; and so nutritive, wholesome and agreeable,—universally acceptable to the infant and the aged—the civilized and the savage,—no possible limit can be set to its consumption. The population of the sugar growing countries—now that Europe is recognised as such by the late, but very extensive fabrication of sugar from the beet root—is estimated at four hundred and sixty-eight million souls. The great traveler and naturalist, HUMBOLDT, states, that in Mexico the consumption is ten pounds per year to each inhabitant. The estimated consumption in England is set down at twenty-four pounds to an inhabitant; in Ireland, five; in Scotland, six and a half; in Belgium, seven; in Holland, seventeen; in Spain, four and a half; and in Portugal the same; France and Germany, at present the great beet-sugar manufacturing countries, are large consumers, the average of the former being seven pounds to an inhabitant; of the latter, five and a half. The total annual consumption of sugar in Europe, is estimated to considerably exceed one thousand million pounds; of which one hundred and forty million, or sixty-two thousand five hundred tons, are beet-sugar. The total annual consumption throughout the world, is set down at six thousand two hundred and sixty-seven million pounds—worth, at six cents a pound, three hundred and seventy-six million and twenty thousand dollars; two hundred million pounds are probably consumed in the United States, which will give to each individual sixteen pounds per annum. Our domestic production—which has rarely proved profitable—is estimated at fifty thousand hogsheads, or fifty million of pounds, to which may be added from ten to fifteen hundred tons of the maple-sugar. In 1837, the sugar *imported* into the United States amounted to one hundred and thirty six million one hundred and forty-nine thousand seven hundred and sixty-one pounds. In the same year, the *exports* to forty million one hundred and twenty-four thousand eight hundred and nine pounds, leaving a balance against us of ninety-six million fourteen thousand nine hundred and fifty-two pounds.

The amount of sugar consumed is almost incredidle. The aggregate quantity *imported* for the seven years ending September 30, 1831, was five hundred and thirty-six million three hundred and sixty-three thousand five hundred and ninety-two pounds; and in the seven years preceding September 30, 1835, the aggregate amount was six hundred and sixty-four million three hundred and seventy-one thousand five hundred and eight pounds. The quantity imported for the year ending September 30, 1837, was one hundred and thirty-six million one hundred and forty-one thousand three hundred and thirty-two pounds; and all this is exclusive of the home manufacture, that from the cane alone amounting to one hundred thousand hogsheads per annnm, besides that made from other materials. The quantity of sugar *exported* for the year ending 1837, according to the

Treasurer's report, was forty-one million fifty-nine thousand seven hundred and ten pounds, of all kinds. The quantity of molasses *imported* during the year 1837, was sixteen million four hundred and fifty-one thousand one hundred and eighty-two gallons.

These facts are cited simply to show to the farmer residing within the zone of the maple, that sugar, which is one of the most nourishing substances in nature, will always be in demand; and that, inasmuch as sugar from the maple is easily fabricated—requires no attention except at the time of manufacturing—that with care in its manufacture and after processes it may be rendered equal to the best productions of the cane or beet, command a fair price, and of course be rendered profitable—that it is the interest of the farmer to protect the trees now remaining, and also to set out others, as described in the preceding paragraphs. While doing this, he not only adds greatly to the beauty of his domain, but also to its prospective value. Besides, the sugar is made usually at a season in which it does not interfere with the ordinary operations of the farm.

The fabrication of sugar from the sap of the maple, is a simple process. But the whole business should be managed with the utmost *cleanliness*. A great objection heretofore urged against the use of it generally, and which has for years past given it a bad repute, is the very slovenly manner in which it is manufactured—and its dark and dirty appearance would deter many from purchasing. There has been much bad practice and wrong management. But it does not follow that it must necessarily continue.

The process of fabricating the sugar, according to the most approved method, is thus stated by the Hon. Isaac Hill, of New Hampshire.

> The work begins usually about the first of March. The tree will yield the liquid long before vegetation appears from the bud: frequently the most copious flow is before the snow disappears from the ground. The clear day following a night of freezing is the best time for running sap. Some persons have a camp in their maple orchards where large cauldrons are set in which to boil down the sap to the consistency of a thick syrup: others take the liquid to their houses and there boil down and sugar off. The process begins by the preparation of spouts and troughs or tubs for the trees; the spouts or tubes are made of elder, sumac, or pine, sharpened to fit an auger hole of about three-fourths of an inch in diameter. The hole is bored a little upward, at the distance horizontally of five or six inches apart, and about twenty inches from the ground, on the south or sunny side of the tree. The trough, cut from white maple, pine, ash or basswood, is set directly under the spouts, the points of which are so constructed as completely to fill the hole in the tree, and prevent the loss of the sap at the edges, having a small gimlet or pith hole in the centre, through which the entire juice discharged from the tree runs, and is all saved in the vessels below. The distance bored into the tree is only about one half inch, to give the best run of sap. The method of boring is far better for the preservation of the tree than boxing, or cutting a hole with an axe, from the lower edge of which the juice is directed by a spout to the trough or tub prepared to receive it. [The latter method, boxing, is highly injurious, and ought never to be adopted.] The tub should be of ash, or other wood that will communicate no vicious taste to the liquor or sugar.
>
> The sap is gathered daily from the trees and put in larger tubs for the purpose of boiling down. This is done by the process of a steady hot fire. The surface

of the boiling kettle is from time to time cleansed by a skimmer. The liquid is prevented from boiling over by the suspension of a small piece of fat pork at the proper point. Fresh additions of sap are made as the volume boils away. When down to a syrup, the liquor is set away in some earthen or metal vessel till it becomes cool and settled. Again the purest part is drawn off or poured into a kettle until the vessel is two-thirds full. By a brisk and continual fire the syrup is further reduced in volume to a degree of consistence best taught by a little experience, when it is either put into moulds to become hard as it is cooled or stirred until it shall be grained into sugar. The right point of time to take it away from the fire may be ascertained by cooling and graining a small quantity. The sediment is strained off and boiled down to make molasses.

A cold and dry winter is followed with a greater yield of sugar from the maple than a season very moist and variable. Trees growing in wet places will yield more sap, but much less sugar from the same quantity, than trees on more elevated and drier ground. The red and white maple will yield sap, but it has much less of the saccharine quality than the rock or sugar maple.

As this is made at a season interfering very little with the other business of the farm, the sugar that the farmer makes is as so much clear gain.

A spoonful of slaked lime to a half barrel of sap is beneficial, it causes the impurities to rise more readily when boiling. Fermentation of the sap usually takes place in about thirty-six hours ; and unless some method is devised of preserving it, it should be boiled without delay. When reduced to syrup it is to be strained through a woollen cloth, hair cloth will answer as well, and stand for a few hours to settle. In boiling down, charcoal is the best fuel to use. The *clarifying* materials should be added at the commencement of this process, (boiling down.) These are generally milk, eggs, or what is better, calves blood. The scum which rises should be carefully removed. The syrup, when properly reduced, is taken from the fire, and stirred for some time in order to give it *grain*, which is thus easily effected by bringing every part into contact with the atmosphere. This is a very important part of the process, for if it is not stirred, but poured into the moulds, it will not be grained, but resemble candy rather than sugar. Molasses and vinegar are generally made from the last runnings, the sap being less adapted for sugar. The molasses, when properly clarified, is superior to that from the sugar-cane, having a peculiarly grateful flavor. The vinegar, though excellent for ordinary use, is not well adapted for pickles.

Claying or whitening the sugar. In two or three days after the moulds or tubs are unstopped at the bottom, mix, white clay with water, so as to reduce it to a thin mortar. With this cover the top of the sugar one inch and a half thick ; when the covering appears dry, remove it, and supply its place by a fresh covering two inches thick. This process may reduce the sugar one-fifth, but it adds correspondingly to the molasses.

Trees should always be tapped on the south side first—as the season advances, on the east and west side—and lastly on the north. The duration of the sugar making season is generally about a month. When the weather becomes warm, rinse out the buckets with lime water frequently, as it will prevent the sap from souring.

An intelligent writer in the Gennesee Farmer, who appears to have devoted much attention to this subject, gives the following account of the improvements recently made in the fabrication of this article :

The first improvement is in the manner of tapping and gathering the sap. The trees are tapped with a half inch screw bit, bored not to exceed an inch and a half deep—two holes, one about three inches higher than the other, so that the spout need not interfere with the emptying of the bucket. The spouts are made of soft maple or ash, turned and bored in a lathe—the one for the lower hole is three inches long, quite tapering, with a crack near the end for holding a wire with which the bucket is suspended—the upper one six inches long, made in the usual manner. The buckets are large, holding from twelve to sixteen quarts, and suspended from the short spout by a wire or string, so that it will swing, and may be emptied without taking off. The advantages of having the buckets suspended from the spouts are, that you catch all the sap, the buckets are not found wrong end up when you have a good run, and a great saving of labor in the gathering. The spouts are durable, lasting, with proper care, as long as the buckets.

The next and most important improvement is in the *boiling*. Instead of three kettles, between two logs, the smoke and ashes flying every way, we have sheet-iron pans of a size corresponding with the number of trees. For a plantation of from one hundred and fifty to two hundred trees, a pan of six feet long, three feet wide, and nine inches deep, would be of a suitable size. This pan is set upon an arch of brick-work, so that the fire extends the whole length of the bottom, and does not touch the sides or ends—therefore they are not liable to burn—a large surface is thus exposed for evaporation, and they will boil off the sap much faster than cauldrons or kettles containing the same quantity. Besides, they are much neater, less in the way, and cheaper. They are made of common sheet-iron riveted together, [Copper would answer a better purpose, especially where sugar is made in large quantities. It gives out heat with much greater rapidity than iron.*] Another improvement is in having suitable buildings, properly fitted up with all the necessary apparatus for conducting the business with facility and convenience—such as reservoirs, buckets, boilers, &c.

Willis Gaylord, Esq., of Otisco, New York, one of the most intelligent and successful agriculturists of that great State, in speaking of the proper period of making sugar from the maple, which depends almost entirely on the forwardness of the spring, usually varying from the first to the fifteenth of March, says:

> In order that the sap may flow freely, the frost must be mostly out of the ground, and a degree of warmth, sufficient to cause the minute vessels in the tree tops to expand rapidly, must exist in the air. The number of trees to be tapped, depends on the means of disposing of the sap nearly as fast as it flows, and on the quantity of sugar it is intended to make. In ordinary seasons four pounds to a tree will not be too high an estimate.

The sap should be boiled away immediately after it is gathered from the trees. The buckets, the receivers, the kettles, should all be kept scrupulously neat and sweet. The sap and the syrup, when boiling, should be carefully scummed and cleansed. Two quarts of milk, stirred into the syrup when cold, and the whole gradually raised to boiling, will completely cleanse a quantity of syrup sufficient to produce thirty-five pounds of sugar. After the addition of the milk the syrup should not be agitated in the least, until the impure mass has risen to the surface, and is ready to be removed by skimming. Lime is used as a corrector of the gallic acid, which at an advanced period of the sugar season, or when the sap has stood for some time, renders the conversion of the syrup into sugar impossible. For this the lime is a corrector. If more sap is gathered than can be boiled down at the time, it is to be stored in a large tub or reservoir, under cover; and a handful of lime is occasionally thrown into it, and when necessary stirred up. A handful of lime will be sufficient for several barrels of sap, if applied often. It is recommended to wash all the utensils frequently with a preparation of lime-water.

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* To make the experiment, take two bars, one of iron the other of copper, of equal length and circumference; place them in the fire, retaining an end of each in your hand, you will find the heat is communicated to your hand by the copper bar some minutes in advance of the other.

Joel Woodsworth, of Watertown, Jefferson county, N. Y. whose maple sugar, refined to the degree of loaf sugar, obtained the premium at a late Agricultural Fair at Rochester, describes the process of manufacture, in a letter to the Society's Committee.

Gentlemen:—I herewith submit to your inspection, 50 lbs. of my maple sugar. The following is a statement of my method of making and clarifying the same.

In the first place, I make my buckets, tubs, and kettles all perfectly clean. I boil the sap in a potash kettle, set in an arch in such a manner that the edge of the kettle is defended all around from the fire; I boil through the day, taking care not to have any in the kettle that will give color to the sap, and to keep it well skimmed. At night I have fire enough under the kettle to boil the sap nearly or quite to syrup by the next morning; I then take it out of the kettle and strain it through a flannel cloth into a tub, if it is sweet enough, if not, I put it into a cauldron kettle, (which I have hung up on a pole in such a manner as to swing it on and off the fire at pleasure,) and boil it till it is sweet enough, and then strain it into the tub and let it stand till the next morning; I then take it and the syrup in the kettle and put all together in the caldron and sugar it off. I use, to clarify say 100 lbs. sugar, the whites of five or six eggs, well beaten, about one quart of new milk, and a spoonful of salaratus, all well mixed with the syrup before it is scalding hot; I then make a moderate fire directly under the caldron, until the scum is all raised, then skim it off clean, taking care not to let it boil so as to rise in the kettle before I have done skimming it; I then sugar off, leaving it so damp that it will drain a little. I let it remain in the kettle until it is well granulated. I then put it into boxes, made smallest at the bottom, that will hold from 50 to 70 lbs. having a thin piece of board fitted in two or three inches from the bottom, which is bored full of small holes to let the molasses drain through, which I keep drawn off by a tap in the bottom. I put on the top of the sugar in the box a clean damp cloth, and over that a board well fitted in so as to exclude the air from the sugar. After it is done or nearly done draining, I dissolve it and sugar it off again, going through the same process, clarifying and draining as before.

The manufacture of Maple Sugar is conducted upon an extensive and profitable scale in parts of New York and the Eastern States. The editor of the Albany Cultivator, in the September nnmber of his valuable paper says—

We have received from Mr. L. O. STEVENS a very handsome and excellent sample of maple sugar manufactured by Mr. JOSEPH M. STEVENS, of Hardwick, Caledonia county, Vermont. Mr. Stevens, we are informed, made the past season 4500 lbs., of superior quality. We agree with Mr. S., that "we see no reason why this sugar may not in every way equal the foreign article in flavor, whiteness, and most certainly in *purity*." He states that the process of manufacturing sugar of this quality is simple and easily explained by the manufacturer.

Mr. ELLSWORTH, in his report of 1843, says—

The amount of sugar manufactured from the SUGAR MAPLE has increased during the past year; and from various accounts, in different sections of our country, it promises to be an article of much importance, and, as it can be refined equal to the best West India sugar, it may be exported. In some of the States it has doubled. Many of them possess large resources in this respect. For instance, it is said that there are at least 30,000 acres of land in Michigan which abound with the maple. A maple-sugar tree is considered worth, to the farmer, from two to three dollars for its sugar; and there are, on an average, in the sugar-maple districts, about 30 trees to an acre, which would give at least 900,000 trees, worth $1,800,000—probably $2,000,000. By suffering a portion of these to remain, while clearing up their land, the farmers would be able to derive much profit from them, from year to year.

SIX REASONS FOR PLANTING AN ORCAARD.

" 1. Would you leave an inheritance to your children ?—plant an Orchard. No other investment of money and labor will, in the long run, pay so well.

2. Would you make home pleasant—the abode of the social virtues—plant an Orchard. Nothing better promotes among neighbors a feeling of kindness and good will, than a treat of good fruit often repeated.

3. Would you remove from your children the strongest temptation to steal—plant an Orchard. If children cannot obtain fruit at home, they are very apt to steal it; and when they have learned to steal fruit, they are in a fair way to learn to steal horses.

4. Would you cultivate a constant feeling of thankfulness towards the great giver of all good—plant an Orchard. By having constantly before you one of the greatest blessings given to man, you must be hardened indeed if you are not influenced by a spirit of humility and thankfulness.

5. Would you have your children love their home, respect their parents while living, and venerate their memory when dead—in all their wanderings look back upon the home of their youth as a sacred spot—an aosis in the great wilderness of the world—then plant an Orchard.

6. In short, if you wish to avail yourselves of the blessings of a bountiful Providence, which are within your reach, you must plant an Orchard. And when you do it, see that you plant *good fruit*. Don't plant crab apple trees, nor wild plums, nor Indian peaches. The best are the cheapest."

THE ORCHARD.

"FINE fruit is the flower of commodities." It is the most perfect union of the useful and the beautiful that the earth knows. Trees full of soft foilage; blossoms fresh with spring beauty; and, finally, —fruit, rich, bloom-dusted, melting, and luscious—such are the treasures of the orchard and the garden, temptingly offered to every landholder in this bright and sunny, though temperate climate.

"If a man," says an acute essayist, "should send for me to come a hundred miles to visit him, and should set before me a basket of fine summer fruit, I should think there was some proportion between the labor and the reward."

I must add a counterpart to this. He who owns a rood of proper land in this country, and, in the face of all the pomonal riches of the day, only raises crabs and choke-pears, deserves to lose the respect of all sensible men. The classical antiquarian must pardon one for doubting if, amid all the wonderful beauty of the golden age, there was anything to equal our delicious modern fruits—our honied Seckels, and Beurres, our melting Rareripes. At any rate, the science of modern horticulture has restored almost everything that can be desired to give a paradisiacal richness to our fruit-gardens. Yet there are many in utter ignorance of most of these fruits, who seem to live under some ban of expulsion from all the fair and goodly productions of the garden.

Happily, the number is every day lessening. America is a *young orchard*, but when the planting of fruit trees in one of the newest States numbers nearly a quarter of a million in a single year; when there are more peaches exposed in the markets of New York, annually, than are raised in all France; when American apples, in large quantities, command double prices in European markets; there is little need for entering into any praises of this soil and climate generally, regarding the culture of fruit. In one part or another of the Union every man may, literally, sit under his own vine and fig tree.—*Downing's Preface, to "Fruit and Fruit Trees of America."*

THE FORMATION OF ORCHARDS, says LAWSON, are to be considered among the permanent improvements of a farm, and should be kept in view in its first arrangement and laying out. Indeed, no farm can be considered as complete without an orchard. An orchard should be of moderate size, that is, proportioned to the size of the estate—the objects to which its produce is to be applied, &c. The planting and care of orchards has been too much neglected in our country, which, from its climate, soil, &c. is admirably adapted for all varieties. Orchards may be considered in reference to soil and situation, the kinds of trees, planting, culture, and the manufacture and disposal of the products. The Farmer's Assistant says that the most suitable soil, for almost every kind of tree grown in the orchard, is that which is warm, dry, and fertile. Even light sandy lands are better for the purpose than stiff clays. It is most advisable to make use of hilly or uneven grounds, if the soil be suitable, and let those that are level be reserved for the plough.

The following excellent article, which appears to have been prepared by the Editor of the Practical Farmer from the very best authorities, we take much pleasure in incorporating in this volume, as affording all, or nearly all, the information necessary on a subject of great interest.

The most desirable aspect, is unquestionably a somewhat elevated and naturally sheltered declivity, open to the south and south-east. But orchards are now found "in every aspect, and on soil of every quality, and under every culture." Although the most approved site is that which is open to the south-east, and sheltered in other points, but particularly that opposite, yet much depends upon the character of the winds of a country. When the violence of a west wind is broken by an intervening rise of ground, a south-west aspect has been found equal to any.

Planting and cultivation.—The first thing to be determined upon, in the planting of an orchard, is the proper distance of the trees; if a mere fruit plantation be the object, the distance may be small; if the cultivation of grain and grass be in view, the space between the trees must be wider; at thirty feet apart, an acre will contain forty-eight trees; at thirty-five feet, thirty-five trees; at forty feet, twenty-seven trees; and at fifty feet, about eighteen to the acre: these are the usual distances, which may be adopted according to the character and depth of the soil. As far as can conveniently be done, trees of the smallest growth may be planted on the lightest soil; and taking every circumstance into consideration, it will probably be found that forty feet is the most eligible distance for a farm orchard. It will admit sufficient sun and air, in our dry warm climate; and until the trees shall be fully grown, will allow of a profitable application of the ground to the cultivation of grain and grasses.

Manner and time of planting.—Much trouble will be saved, and much accuracy in planting insured, by marking the sites of trees by stakes, previous to digging the holes. In shallow soils, the holes may be made to the depth of two spits of earth, scattering the lower spit at some distance, and supplying its place by an equal quantity of the neighboring surface earth. The depth of the hole must depend on that of the subsoil.

An eligible mode for the lighter soils, which has been practiced with much success, is to supply the place of the stratum of poor earth by one or two loads of meadow mud, ditch banks, or good surface soil, laid round each tree after planting, and ploughing the ground for a fallow crop the next spring, when the mud has become completely pulverized by the frost. The size of the hole should be sufficient to admit a spade handle when laid horizontally in the bottom, affording ample room for the expansion of the roots in loose rich earth. Well digested compost is useful round newly planted trees, in stiff or cold soils. Both lime and fresh stable manure have been found prejudicial in the dry and hot weather of summer. The latter substance is too frequently a cover for moles and field mice, which are extremely injurious in winter to trees of even six or eight years old, in light soils. Every kind of manure on the surface, gradually mixing it with the soil by cultivation, has been found beneficial, and the best security against drought in summer and vermin in winter.

The proper season for planting will be found to depend on a variety of circumstances. In light soils, the winter settles the earth round the roots, and best secures them against the drought the following season. It is a time of leisure to the farmer, and affords an early selection of trees from the nursery. In stiff or wet soils, spring planting, other circumstances being equal, is to be preferred. But where proper care and attention is bestowed, success may follow in both cases. In whatever season an orchard may be planted, too much attention cannot be given to extend the roots in every direction; to cut off all wounded parts, and more especially not to plant too deep. This is the common error of inexperienced planters. As a general rule, trees should be planted in the orchard with about three inches of earth over the upper tier of roots, which will make it about two inches deeper than it stood in the nursery. The trees, after being partially covered, should be well shaken, to admit the finer particles of earth among the fibrous roots, and be well settled by treading the earth around it.

The tops of young trees should never be shortened, lest it produce a growth of suckers. They may be thinned if found too heavy. If the trees have been long out of ground, and the roots have become shrivelled at the time of planting, the labor of pouring a pailful of water round each tree, will be amply repaid in the success it will insure in their growth.

Cultivation of the ground.—The looser the ground is kept for the first, and indeed for several succeeding years, the more certain and more vigorous will be the growth of the orchard. Every stage of cultivation is strongly marked in the luxuriance and color of the foliage of contiguous plantations. Those orchards which have been two years under cultivation, exhibit a striking superiority over those which have been but one year under the plough; while these in their turn surpass the fields in clover or in grain, both in the quantity and size of the fruit. When clover is sown in young orchards, it will be well to dig the earth for about three feet, at the root of each tree. A man will dig round 100 trees in a day; the trifling loss of grass and labor will be fully remunerated by the improved vigor of the tree. When the ground can be spared from cropping, four or five furrows on each side of a row will be found a most eligible mode of promoting the growth of a young orchard.

All fallow crops are most favorable to the growth of orchards, at every early stage of their cultivation. Indian corn, potatoes, and vines, are preferable to oats or barley; and these again are more favorable than winter grain. Buckwheat is among the most beneficial crops for the promotion of the autumnal growth of trees. Clover is by many farmers believed to be injurious to young trees. Its tendency to check the growth of trees, will be found to be in proportion to the air and moisture, which its greater or less vigorous growth may keep from the roots. Light and heat appear to be as necessary to the roots, as to the branches of trees. Clover, while it occupies the ground, must prevent cultivation, and may so far be found pernicious, but probably not in a greater degree, than any other luxuriant and deeply rooted grass, absorbing the moisture, and exhausting the strength of the soil, which covers the roots of small trees.

In the arrangement of an orchard, both convenience and beauty will result from planting each kind of trees in distinct contiguous rows. Some cultivators pay particular attention to continue in the orchard the aspect the tree maintained in the nursery. Mr. Coxe says, I have sometimes adopted the practice, without much confidence in its efficacy; nor can I think it probable that trees growing in close rows in the nursery, not much exposed, can by any habit so limited in its duration, be affected by any permanent contraction or rigidity of the bark or sap vessels, which are the only effects I have ever ascribed to the influence of aspect on the stems of young trees.

The prevalent winds of our climate are from north-west. In light soils their violence will sometimes give an inclination to newly planted trees to the south-east. This may easily be remedied by setting up the trees while young, and when they have attained a large growth, it may be overcome in a great degree by cutting off the leaning branches, and by freely pruning the leeward side of the tree. But this may be prevented in the beginning by fixing short poles or stakes, and tying the tree to them.

Moss is a plant produced by poverty and neglect; it is very prejudicial to trees, and should be carefully removed. This can be readily done by rubbing the trees in damp weather with a bone or the back of a knife. A good cultivator will generally prevent the growth of moss. Whitewashing the stem not only cleanses the tree of moss, but destroys many kinds of lice injurious to fruit trees. It is followed by a cleanliness in the bark, after it has been dissolved by the rain, and promotes the health and vigor of the tree whenever applied.

The Nursery.—It has been said, and we think with much good sense, that "every farmer ought to raise his own trees," because, besides the risk, inconvenience, and expense of bringing our plants from abroad, we have, in pursuing that mode of supply, to encounter the mistakes and the ill consequences which follow a want of analogy between the soil in which the plants were raised, and that to which they are to be transferred. The first step, therefore, towards obtaining a good orchard, is to create a good *nursery*. The situation most favorable for this, is a piece of level ground, defended from cold and violent winds either by natural or artificial means, and which in composition is neither wet nor dry, and of only middling fertility. This condition of the soil is a circumstance of much importance, and ought to be rigorously observed; because the vessels of young trees, growing in rich soils, take a size proportioned to the quantity of sap they receive and circulate, and if their situation be changed for the worse, the quantity of the sap being necessarily diminished, the vessels become rigid and unhealthy, and unable to carry to the extremity of the branches the nourishment required by them. The ground (selected on these principles) must be securely fenced, thoroughly ploughed and harrowed, freed from stones and the roots of perennial plants, and then thrown up into three or four feet ridges, on which you will sow and cover your apple and pear seed, and plant your cherry and peach stones. It will now be useful to roll the beds, for the purpose of bringing the soil and the seeds every where into contact; after which they may be covered with clean straw for the winter. In the spring, your young apple and pear trees will show themselves, and after them your cherries and peaches. The treatment to all will be the same: they must be thinned to the distance of fifteen or twenty inches from each other, kept perfectly free from weeds, and if the weather be hot or dry, occasionally watered. They require only a repetition of this process, with the addition of a little careful pruning, till they have attained the height of seven or eight feet, when they are fit for grafting. It is generally known that by this operation we continue any given species of fruit; but a fact with which the public is less acquainted is, that if the graft be also grafted, the product is improved in quantity and quality; and it is to be presumed, will continue to improve, under every new and similar operation. Grafts to be well chosen, should be taken from the wood of the present year, from young and healthy races, and accommodated to the future use of the fruit. As we but speak of grafting in this place incidentally, it will not be expected that we should go into a dissertation upon that art, nor to elucidate the many divisions and subdivisions, which technical men have made of it. It is enough for us to say, that of all these different modes the *scion* and the *slit* is the simplest and the best. When your grafts have acquired some inches in length, it may be well to rub off all the buds which have pushed below them on the stem, and perhaps a few of those which have appeared above them; and if the grafts themselves put out any lateral shoots, spare them until the succeeding year, when you are called to re-graft such as have failed, and to furnish props to those which are feeble, or crooked, or ill-directed.

The year after planting, and in the month of February, when there is no circulation of sap, you will do well to begin to give the heads of your young trees that form which you wish them ultimately to take. The more circular you make them the better, always taking care to lop off those branches which do already or may hereafter, cross others having a proper direction. This proper direction will be generally horizontal, but with a slight curve; an opinion requiring perhaps a little explanation. All straight branches produce what are usually termed gourmands, or gluttons, giving little if any fruit themselves, and exceedingly exhausting to the tree. Curved branches, on the other hand, rarely produce gourmands; and when the season is favorable, give much fruit. The observation of these facts, made long since, and probably growing out of the management of espaliers, first suggested the practice of bending straight branches by artificial means. The effect entirely justified the theory: these straight and barren branches, bent into nearly half a circle, changed their character with their shape, and became very productive. But there is a time for this, as for all other things, and unless the experiment be begun about the first of July, and continued to September, it will fail; because it is only within that period that fruit buds are formed.

As your trees advance in age they will require *pruning*. Suckers must be removed, and dead and dying limbs taken off. For this purpose a hand-saw, a chisel, a mallet, and a gardener's knife are the instruments to be used; all others must be proscribed, and particularly the axe, which, in the hands of folly and ignorance, has been so mischievous to fruit trees. Wounds, if large, should always be covered from drying winds, from moisture, and even from air. In gummy trees, as the peach or the cherry, this precaution is indispensable, and the neglect of it a disgrace, since the best covering is that composed by cow dung and clay—materials costing nothing and always at hand.

On this subject one other rule may be given, and that is to open the ground about the roots of the trees in the fall, to the influence of the air, rain and frost The last of these, besides promoting vegetation, destroys many insects in the chrysalis state, which, if left undisturbed, would in the spring be very injurious. Another part of the same rule is to cover with straw in the spring the ground you make bare in the fall; the object of which is to prevent evaporation by interrupting the rays of the sun, and thus securing to the roots the moisture necessary to their welfare.

Grafting and Inoculating.—Grafting is a mode of propagating varieties of fruit of esteemed quality. Grafts may be cut at any time after the fall of the leaf in autumn, and before the buds begin to swell in the spring. They should be of the preceding year's growth, and are best from bearing trees and exterior limbs. They may be preserved by imbedding their larger ends in clay, a potato, or in moist earth, in a cellar in winter, or in the open ground, partially or wholly covered, in the spring. Grafts are frequently sent across the Atlantic. The great care should be, that they are not kept too warm or too moist, so that the buds swell before they are wanted for use. The rationale of grafting will suggest the time and the manner in which it should be done. The scion and graft are to be so adjusted that the sap wood of the stock, by which the sap ascends from the roots, comes in contact with the sap wood of the scion; and a like adjustment must be observed between the inner bark of both through which the sap descends from the graft to the stock, after it has been elaborated in the leaves. Without the first precaution, the sap will not reach the graft, which will consequently shrivel and die. Without the last, the graft cannot knit or unite to the stock; for it is the descending sap which forms the new wood, and which indeed causes the graft to send its roots down in the earth, upon the outside of the wood, but under the bark of the stock. The union can only take place after the sap has begun to circulate in the stock, which is when the buds are bursting. The clay or composition is applied to exclude the drying influence of the air and sun, and also rain, from the wound, until a complete union has taken place. The graft does not become injured by being somewhat shrivelled before it is inserted; but if it appears too much so, it may be buried a few hours in moist earth before used. The compositions used as substitutes for clay are many. A good one is, one part tallow, two parts beeswax, and four parts rosin, melted and incorporated like shoemaker's wax. If the weather is cold this will require to be softened by immersing it a time in warm water. A thin layer of this, covering the end of the stock and the slit, will suffice. With the addition of a little more tallow, the composition may be spread upon linen or cotton cloth, when warm, and the cloth cut to the required size for a graft, and applied with less trouble in the form of a prepared plaster. The different processes of grafting are so generally known, that we need not detail them ; our object being only to throw out such suggestions as may tend to render the success of operation more certain.

Transplanting.—Success in transplanting trees depends much on the treatment they receive in that operation. On removing the trees from the nursery, care should be taken to prevent the roots from lying previously to planting them, otherwise they may receive considerable injury ; and when they are to be transported to a distance, particular care should be taken to preserve them from drying winds before packing. Immediately on their receipt the bundles should be unpacked, the roots well watered and "laid in" until the ground in which they are to be planted be ready to receive them. By laying in, is to be understood the making of a trench sufficiently large to admit the roots, into which they are placed ; the earth having been previously made fine is then filled in around them, and a gentle watering given, in which situation they may remain with safety, until planted.

The holes in which it is intended to plant them, should, for an ordinary sized nursery tree, be from two and a half to three feet in diameter, and about the same depth ; the earth from the bottom should be thrown aside, and the place filled up with good compost or black mould (no fresh stable manure should be used in the compost). The tree should be planted one or two inches deeper than it stood in the nursery, the roots and fibres being spread out horizontally, and during the process of filling in the earth, the tree should be shaken several times, as to admit the soil between the roots, and also to fill up any cavities that might otherwise remain. The earth should then be trodden down and gently watered ; in a short time it will have settled, and any hollows that may have formed should be filled up—finishing by forming a basin around the trench to receive the rain or watering which may be necessary to give it, if the ensuing season should prove dry ; to prevent the winds from loosening the earth round the roots, the tree should be secured to a stake by bands of straw.

The proper season for transplanting trees in this latitude, is from the middle of October to the first or middle of May. Trees transplanted in autumn should have the roots a little protected during the first and most trying winter. This protection may consits of a few inches of litter from the stable, placed among their trunks and over their roots. Moss from the meadows or evergreen boughs are, however, preferable for delicate plants, as these substances being almost incorruptible, never injure what they were designed to protect.

"We have observed," says the Genesee Farmer, "in regard to transplanting fruit trees, that we have rarely lost one that stood in cultivated ground, where the hoe was introduced several times in the course of the summer ; but, on the contrary, where the trees were set in grassy land, or where the cultivation was neglected, our losses have been considerable. We therefore advise in order to insure the safety of such as have been planted out, either in the last autumn or this spring, to have the ground well hoed round them once a month ; and if it be done every fortnight, it will be still better. The labor will not differ very materially from hoeing a hill of corn. It is worthey of notice, however, that the oftener it is done the easier it is to do—because the soil will be kept loose and mellow.

"To water trees in that condition may sometimes be useful ; but we are not free to recommend it very highly. A loamy soil that is much watered soon becomes hard ; the surface is glazed, rendered in a great measure impermeable to the air, and consequently is no longer capable of affording in dry weather the necessary nourishment to the plant. The sources of its fertility are obstructed. This may be better understood to some of our readers, when we state on the authority of Sir Humphrey Davy, that a soil in the greatest degree absorbent, exposed to the atmosphere till it becomes dry to the touch, still contains moisture equal to one-eighth part of its whole weight. This is discoverable by subjecting it to a heat indicated by 300 degrees of Fahrenheit's thermometer. Now all water not chemically combined, but only *adhering* to parts of the soil, is in constant use in vegetation: and the one-eighth part referred to is of this kind. If we estimate common fertile soils, however, as containing only one-twelfth part, then in 400 pounds of soil, even when it is dry to the touch, we shall have 33 pounds of water in store for the use of vegetation; and it is particularly worthy of notice, that such soils when deprived of a portion of this by plants, procure a fresh supply *by constantly absorbing water from the atmosphere,* where it exists in the state of vapor. In effect, a good soil is a perpetual fountain, even in dry weather.

"From these statements it must be evident, that unless the ground is frequently cultivated and kept mellow, so that between its particles the air can pass in, the latter cannot impart the moisture which it holds in solution; but when the soil is freshly broken, minutely divided, and prevented from conglomerating, these invisible springs are preserved in order, and plants that drink from them will long resist the drought. Let the hoe then, be freely and frequently used."

Pruning.—The principal objects of pruning, are to procure a good bole or trunk for timber, to form a head for the protection of fruit, and to subserve the purpose of ornament.

To effect these objects with the least trouble and greatest advantage, upon all non-resinous trees, the following rules are recommended by Juge Buel.

1. Begin to prune the tree when it is young.
2. Cut close and smooth to the bole or limb.
3. Cut, when small, the branches which are likely to interfere, or become useless, and which, if suffered to remain, will require to be removed at a more advanced period of growth.
4. Do not trim to excess. Let the branches occupy *at least* a third of the entire height of a tree.
5. Do not prune when the tree bleeds. Where the preceding suggestions are observed, we may add—
6. Prune in the summer.

He then proceeds to offer his reasons for the rules here recommended:

First, The food required to nourish the lateral useless branches, will go to increase the diameter and height of the plant, or swell the fruit, if these are judiciously removed. But a main consideration is, that the excision of small branches causes only small wounds, and small wounds speedily heal. The observation of this rule, therefore, facilitates growth, promotes health, and ultimately saves labor.

Secondly, This rule needs very little argument to enforce its propriety, as every observer must have frequently seen and lamented the ruinous effects of an opposite practice. The snags either send out useless spray, or deprived of the feeble aid of these, they die and rot, and carry disease into the bole, and are thus often the cause of the premature loss of the tree. If cut close, the enlargement of the living wood soon covers the wound. In large branches, where the saw must be used, the healing process is greatly facilitated by paring the cut, particularly the exterior edges, with the pruning knife; and it is a good precaution, before you use the saw, to notch under the intended cut, to prevent tearing the bark when the limb falls. In extirpating sprouts from the roots, (and neither they nor those growing from the bole should be suffered long to remain,) the like precaution of cutting close should be observed; for which purpose it is necessary first to remove the earth from about the collar, with the spade or other instrument.

Thirdly, The reasons for pruning a tree while young, apply here: it is easier to cut small than large limbs, and the wounds of the former soon heal. But the question presents, what limbs are to be cut? Generally all that are likely to cross each other, all feeble spray, the strongest on the bole, and the weakest in the top; for while the trees are in nursery, I think it serviceable to leave a few scattering laterals upon the bole, and it is beneficial, at all ages, to thin most kinds in the top. Yet the answer to the inquiry will depend principally upon the species of tree, and the design of the planter. If his object be timber, the leading shoot should be feathered up in a spiral form, and all other shoots likely to interfere with its growth be cut away. If the object be fruit, beauty and utility are to be consulted, and these seldom are incompatible in the eyes of a fruit grower, for with him productiveness constitutes beauty. If ornament be the main consideration, no special directions can be given, as the species employed, the location, and the taste and fancy of the planter, will have a controlling influence. The rule for timber trees will not apply to either those destined for fruit or ornament.

In orchard and garden fruit, generally, the endeavor should be to obtain a low and spreading top. When a clean bole is obtained to a sufficient height, say in the orchard, of seven or eight feet, and in the garden, according to fancy, the leading shoot should be cut in, and three or four more branches left to form the head; which, when the habit of the tree will permit it, should be pruned so as to give it a besom form, or that of a broom divested of its centre. Several advantages arise from this and a more extended form. It admits the air more freely, to mature the fruit and wood; it renders the trees less liable to be blown down; it facilitates the gathering of the fruit, and the pruning of the tree. But its principal advantage consists in its tendency to increase oviparous or fruit buds, and consequently to augment the fruit. A great growth of wood seems to be incompatible with a great crop of fruit, and vice versa. A cow that gives much milk seldom takes on much flesh during the milking season. If the secreted food is converted into milk and fruit, there can be but little reasonable hope of its adding to the flesh of the animal, or the wood of the vegetable. Erect branches produce most wood buds. Straight limbs produce less fruit than those that are curved or crooked. Whatever retards or diminishes the flow of elaborated sap, in a healthy tree, is favorable to the production of fruit. Hence wall trees, whose limbs are trained in the form of a fan, or in a horizontal direction, bear better fruit than those that grow upright as standards. Hence young trees are more apt to show blossoms the first and second year after transplanting, than in the two subsequent years. Pomologists have endeavored to render this law in vegetation subservient to their interests, by adopting artificial means for producing the production of fruit buds. These means consist in ring-barking, transplanting, cutting the roots, training, pruning, &c. The pears in the Caledonia horticultural garden are trained *en quenouille*, that is, the lateral branches are cut in to a short distance of the main stem, and kept so, and the fruit is produced on the spurs growing from these short branches. In the horticultural garden of London, the limbs of the pear are tied down in a drooping position, resembling somewhat in appearance the weeping willow. The vines cultivated at Thomery, celebrated for their superior fruit, are planted eighteen inches apart, trained in the form of a T, the top horizontally, and restricted in their growth to four feet from the main stem. In this way a treillance of eight feet long, and eight feet high, is sufficient for five vines, which produce upon an average 320 bunches of fruit. These modes of training have a common object that of restricting the growth of wood, and producing an increase of fruit. Those who wish to examine the modes of training here spoken of, in detail, are referred to LOUDON's Gardener's Magazine.

Fourthly, Leaves are as necessary in the economy of vegetation as roots. The sap must be elaborated in these before it can be transmuted into wood, bark, or fruit. A tree cannot thrive, therefore, when these organs are deficient or diseased. If sufficient leaves or branches to produce them, are not left to concoct or digest the sap which is propelled from the roots, the tree, to use a modern term, but a just comparison, becomes *dyspeptic*; the vegetable blood is vitiated, the wood loses its texture, and a stunted growth or premature death generally ensues. Hence great precaution should be used against excessive pruning.

Fifthly, To prune when the tree bleeds tends to debilitate, by wasting what is designed as food for the tree. I have known it fatal to the vine. What is called bleeding is the flowing of the sap from wounds, before it has been converted into aliment. This sap flows most freely while the buds are swelling, and until the leaves are fully capable of discharging their office, as is strongly instanced in the maple, birch, &c. Our orchards are generally pruned in March, which is probably the most unfavorable month in the year for this operation.

Sixthly, The advantages of summer pruning are that the tree being then in vigorous growth, the wounds heal speedily; and the sap being concocted and thick, does not flow from the wounds, and thereby impair the health of the plant. Summer pruning should not be performed, however, before July, when the new growth has considerably advanced. It may be well to add, as this suggestion may seem unsound, that summer pruning is recommended by the best authorities. "As a general rule," says PONTNEY, "summer is preferable to winter pruning:" and SANG suspends pruning "from the beginning of February, to the middle of July, but carries it on during every other month of the year."

In regard to evergreens, which with us are confined principally to resinous trees, it is the general practice of nurserymen, and I think it a judicious one, not to prune them until they have acquired some years' growth, and then but sparingly, and at long intervals, displacing two or three tiers of the lower branches every two or three years. MONTEITH says, "never cut off a branch until it has begun to rot, as the bleeding of a live branch will go far to kill the tree."

The implements employed in pruning, and the manner of using them, are matters of moment. If the operation is commenced when the tree is young, and judiciously followed up, a good knife, a small saw, and a chisel fixed on a six foot handle, to trim the tops and extremities of the branches, are all the tools that are required. A large saw will be occasionally wanted; but an axe or hatchet should never be employed, as they fracture the wood, bruise and tear the bark, and disfigure the tree.

Diseases of Fruit Trees.—Fruit trees, like other productions of the vegetable kingdom, have their enemies and their diseases. All excesses of heat or cold, wetness or dryness, are unfriendly to them; sometimes wholly destroying their fertility for the season; at others seriously injuring it, and occasionally, though rarely, disorganizing the trees themselves.

Many insects also prey upon them, attacking their leaves, blossoms, fruit, bark, or roots.

But, after all, may not our own negligence be considered as the most fruitful source of many others of a similar kind? We often find their bark covered and colored with parasites, in the form of moss, lichens, and smut, which a small degree of labor and a little whitewash would entirely and promptly remove. We often see the ravages made on their leaves and fruit buds, by caterpillars of different names and appearances, when if we visited them at day-break, all would be found at home and asleep, and entirely within our reach. And lastly, we often see wounds inflicted on stems and branches (under the name of pruning,) left open to the alternate action of air and frost, and sunshine, and thus occasion fatal consequences, when a cheap and simple covering (a mixture of clay and cow dung) would prevent the difficulty.

There cannot be a doubt that many of the evils above referred to, might be remedied by timely attention. Trees may be kept free from insects by washing them with soap suds before the insects have left those places where they have passed the winter, and before the eggs which were deposited under the loose bark, and beneath limbs, &c. are hatched. By early washing trees and vines, with strong soap suds, or with lime-water, not only are innumerable eggs and insects destroyed, but the young plants and seeds of many varieties of mosses which infest or injure trees and vines, are destroyed also. Trees that are annually washed, have a more healthy appearance than those that are not, when growing side by side.

The application of lime has been known to restore old and apparently worn out trees, to renewed health. A gentleman in Essex, England, having in his orchard many old supposed worn out apple trees, which produced fruit scarcely larger than a walnut, last winter took fresh made lime from the kiln, slaked it in water, and (without allowing time for its caustic quality to be injured by imbibing fixed air) well dressed the trees, applying the lime with a brush. The result was, that the insects and moss were completely destroyed, the outer rind fell off, and a new, smooth, clear one formed; and the trees, although some twenty years old, have now a most healthy appearance. The same treatment may be extended to other fruit-bearing trees, and probably with similar beneficial results.

Mr. WHEELER, of Framingham, (Mass.) recommends to wash trees with a solution of potash. He says,

"Dissolve two pounds of potash of the first quality, in seven quarts of water, for the bodies of the trees. If the limbs are covered with moss or lice, I take a painter's brush, and apply the solution to the moss, &c., with care not to touch the leaves or buds. It may be done at any time of the year when we are most at leisure. Once in two or four years is generally sufficient. I have no general rule, however, but wash them as often as they appear to need it—which is always when the bark is not smooth.

"No person need be afraid of this application injuring fruit trees; but it may be applied with the utmost confidence. I have used it for nearly twenty years with great effect. I have recommended it to a great many gentlemen, but only a few have used it. Those who have tried it, are much pleased with its operation. The reason that it has not been more generally used is, that it has been fashionable to daub the trees with lime, clay, manure, and other compositions, which take two or three years to wash off, before the trees will look natural. When this solution of potash is applied, it has the desired effect immediately. It kills moss and lice at once; and the first rain that comes washes the bark perfectly smooth, and gives it a fair, natural, healthy color."

Caterpillars may be easily destroyed, if taken in time, and at the proper time. Early in the morning, and in wet weather, they may be found concentrated in a small compass, under their web. If within reach, the whole colony may be crushed in a moment with the hand. To reach the more elevated webs, wind the end of a pole with rags, and with this destroy them. Or, what is better, affix a Pickering brush to the end of the pole, and with this destroy them. This brush is round and conical, somewhat resembling a bottle brush. A man or boy will clear an orchard of this pest before breakfast; and the operation may be repeated, if necessary, without expense, or much loss of time. Or, in place of a brush, put a spong or swab made of rags, on the end of a pole, saturate it with lye made from common wood ashes, or soap suds may be used instead of lye; with this preparation give their nests a thorough washing early in the morning before these mischievous animals have gone abroad for their food. This will instantly prove fatal to them. Be careful to break the web of the nest, because they are so constructed as to shed the rain and dews, the animal will thus escape. Not one of them can live a minute after being wet with this liquid.

Many methods are prescribed to protect the different kinds of fruit trees from injury by insects, worms, &c., but these will be spoken of under the head of the trees themselves.

Orchards are generally composed of Apple, Pear, Peach, and Cherry trees; though to these may be added some others.

The *Apple Tree.*—"Of the many fruit trees in cultivation," says the author of the Treatise on Agriculture (Mem. Board of Agr. N. Y.) "this may be deemed the most important; not only from the great abundance, diversified character, and numerous uses of its produce, but from the small degree of care and labor required in its culture, and the uncommon facility with which it adapts itself to a great diversity of soils, climates, and situations. One of its varieties (the crab) is a native of our own forests; but the cultivated sorts among us have all been derived from Europe."

The apple is used for the table, for cooking, and making cider. In the selection of sorts, therefore, regard will probably be had to all these objects. But these are so numerous, that not one man in a hundred, and probably not one in a thousand, says another writer, in the same work, possesses sufficient knowledge of the numerous varieties to enable him to make a judicious selection. One wishes to cultivate the summer and early autumn kinds for marketing; another more remote from towns, would confine his attention to the choice of winter varieties, or those which yield the first quality of cider, while all are desirous of planting a succession at least for domestic purposes. The synonymes are so numerous of some varieties, that they are scarcely known in two states by the same names. Our tastes are êxtremely variant. With some, size is every thing; with others, color; and others again regard as material the flavor, the rarity, or the qualities for bearing, or late keeping.

The following list is from the treatise above referred to (by J. ARMSTRONG, of Dutchess,) and is designed to exhibit those sorts which stand highest in horticultural estimation, for the hardiness and productiveness of the tree, the excellence of the fruit, and the variety of uses to which they may be applied. We have identified the names (so far as we could) with those given by Kenrick, in his New American Orchardist.

FOR THE TABLE, FOR CIDER MAKING, AND FOR COOKING.

Golden pippin.—A good bearer, fruit fine.
Newtown pippin, good bearer, fruit fine.—*Kenrick, 2 sorts, green and yellow Newtown pippin.*
Fall pippin. Great bearer, fruit fine. *Kenrick, Fall pippin.*
Elton pippin.—Great bearer, fruit fine.
New scarlet pippin.—Middling bearer, fruit fine.
Padley pippin.—Middling bearer. *Kenrick, Padley's pippin.*
Spitzenberg.—Good bearer, fruit excellent.—*Kenrick, Esophus Spitzenberg.*
Swaar —Good bearer, fruit excellent.—*Kenrick, Swaar.*
White Calville.—Great bearer, fruit fine.
Red Calville.—Great bearer, fruit fine.—*Kenrick, Red Calville.*
Autumn Calville.—Good bearer, fruit fine.—*Kenrick, Red Autumn Calville.*

PRINCIPALLY FOR COOKING.

Kentish Russet.—Great bearer, fruit fine.—*Kenrick, Kentish Broading.*
Beauty of Wilts.—Great bearer, fruit fine.
French Crab.—Great bearer, fruit fine.
Hollow Eyed.—Great bearer, fruit fine.
Cornwall Pearmain.—Great bearer, fruit fine.
Keswick Codline.—Very great bearer, fruit fine.
Dutch Codline.—Great bearer, fruit fine.—*Kenrick, Dutch Codline.*

FOR THE TABLE OR COOKING.

Rennet Frank.—Good bearer, fruit fine. *Kenrick, Reinette Franche.*
Grey Rennet.—Good bearer, fruit fine.—*Kenrick, Reinette Grise.*
Golden Rennet.—Good bearer, fruit fine, *Kenrick, Reinette Dore'e.*

Apple trees are liable to depredations from several quarters. Beside those formerly mentioned, with the means of their remedy, the *borer*, a worm which perforates the wood, at the surface of the earth, a little below where the bark is tender, is an enemy to be contended against. If the worms have penetrated the tree, it will be necessary, of course, to pick them out; but this may be prevented by a timely application of the wash (potash) before referred to; which has been found an effectual remedy against the borer. It is said that the eggs which produce this insect are deposited from the last of April to the beginning of June (that is, during the month of May, so that the latter end of May or the beginning of June will be the proper time to make the application). Every other year will answer for this remedy, but the horticulturalist will find himself amply repaid by a more frequent application.

The Canker worm.—The female of this insect comes out of the ground very early in the spring, and ascends the tree to deposit her eggs, which she does in suitable places in the bark, where they are brought forth, and the young brood live on the leaves of the tree. Several methods for subduing them have been tried with some degree of success.

1. Tarring. This must be commenced as soon as the ground is bare of snow, (which is in some years as early as February,) that the first thawing of the ground may not happen before the trees are prepared. A strip of canvass, or linen, three inches wide, should be put round the tree, having first filled the crevices of the bark with clay mortar; draw it close and fasten the ends strong. A thumb rope of tow should be tied round the lower edge of the strip to prevent the tar from running down on the bark and injuring the tree. Let the strips be plentifully smeared with cold tar, of a proper consistence, to be put on with a brush. It must be renewed once a day without fail. The insects are so amazingly prolific, that if ever so few of them get up, a tree is ruined, at least for the ensuing season. The best time is soon after sunset, because the insects pass up in the evening, and the tar will not harden so much in the night. This work must be continued with care, generally till the last of May.

2. Mr. Nicholson recommends to scrape off the shaggy bark to the width of two or three inches; then make a mixture of oil, or blubber, with suitable proportions of sulphur and Scotch snuff; and lay this on with a brush, forming a ring an inch or two wide; and no insect will ever attempt to pass this barrier as long as the composition has any considerable moisture left in it. Let it be repeated when it inclines to harden; though perhaps this is not necessary.

3. The pasturing of swine in an orchard in the fall and spring, has been found very serviceable. These animals appear to possess a natural instinct directing to search for vermin and insects, which conceal themselves in the earth.

4. The late Mr. Peck, of Massachusetts, recommended as an effectual remedy, turning up the ground carefully in October, as far as the branches of a tree extend, to half a spade's depth, or five inches, so as completely to invest the surface. Break the clods, smooth the surface with a rake, and pass a heavy roller over it, so as to make it very hard, and without cracks. If the frost should heave and crack the smooth surface in the winter, it must be smoothed and hardened again in March. This will be found less expensive than the long course of tarring.

5. Dr. Thatcher thinks it highly probable, that a quantity of sea-weed pressed round the trunks of fruit trees, extending three or four feet, would prove a remedy, by forming a compact substance, through which the canker moth and worm would not penetrate.

6. Mr. Kenrick, of Massachusetts, proposes to destroy canker worms by the following method: from any time in June, after the worms have entirely disappeared, until the 20th of October, let the whole of the soil surrounding the trees, to the extent of four feet, be dug up and carted away to a considerable distance; and let there be returned an equal quantity of compost, or rich earth, intermixed with manure. By this operation, the farmer, besides exterminating the worms, promotes the growth and fruitfulness of his trees, and defends them against moles. The author of the Farmer's Assistant observes, that by taking the earth away from the roots of the trees very early in the spring. and destroying whatever may appear to be the abode of any insects, and then returning the earth back, mixed with a small quantity of sulphur, sprinkling some of this upon the surface, is, he believes, the most effectual method to keep every kind of insect from ascending.

7. Mr. Knapp, of Boston, has been very successful in the application of lime, as follows: Dig the turf, lay the ground smooth, and apply the lime in the fall. Take air-slaked lime, strew it about an inch thick, to the extent of two or three feet from the roots of the trees. The digging round the trees is highly useful, while tarring is injurious. The expense is not great: a man can dig round fifty large trees in a day. The lime is a most salutary manure to the trees. After the spot has been once opened and limed, the labor of keeping it open will not be great. Three hogsheads of air-slaked lime, or sweepings of a lime store, will suffice for fifty trees, and will cost three dollars. As it is done but once a year, he thinks it cannot be half so expensive as tarring.

Mr. Ruggles, of New Haven, Conn., says he was some years ago struck with the idea that the capsules of the American chestnut, or chestnut bur, might be applied with advantage to prevent the effects of the canker-worm. We accordingly took a piece of strong twine and sail needle, and made a band of them, placing all the backs one way, which caused the spires to project in all directions. We tied this round the trunk of an apple tree, in the centre of an orchard, that was much injured the year before; the tree bore abundantly without the leaves being injured in the least, while those around were all ruined for that year.

He has since tried it several times with entire success. A set of bands will last many years, if taken off when the insects have done ascending, and secured in a dry place. He usually put the bands on the trees about the beginning of March. In places where chestnut burs are not easily obtained, he thinks the use of the fuller's teasel would answer the same purpose.

The Curculio.—The curculio is a winged insect or beetle. The manner in which it injures and destroys fruit, is by its mode of propagation. Early in the spring, about the time when the fruit trees are in blossom, the curculio ascends in swarms from the earth. They crawl up the trees, and as the fruit advances they puncture the rind or skin, and deposit their embryos in the wounds thus inflicted. The maggot thus bedded in the fruit, preys upon its pulp and juices, until in most instances the fruit perishes, falls to the ground, and the insect escaping makes a retreat into the earth, where it remains until the coming spring.

Various modes have been recommended and practised to destroy this insect or avert its attacks. One fact mentioned by Dr. **Filton**, renders it extremely probable that the same remedies might be effectual here, which are prescribed against the canker-worm. He says that two trees of the same kind may stand in the nearest possible neighborhood, not to touch each other, the one have its fruit destroyed by the curculio, and the other uninjured, merely from contingent circumstances, which prevent the insects from crawling up the one while they are uninterrupted from climbing up the other.

Among the proffered remedies is that of suspending tarred shingles in various parts of the tree, the odor of which is supposed to be repugnant to them. Digging round the trees, in the manner before mentioned, has also been advised. It has, however, been observed, that those orchards are most free from their depredations to which the domestic animals have free access. Hogs, by devouring the fruit that falls, before the insects have time to escape; and poultry, who are great devourers of all sorts of insects, will contribute greatly to this end. Therefore it is, that smooth stoned fruits in particular, succeed much better in lanes and yards, where the poultry run without restraint, than in gardens and other inclosures from which they are excluded. Horned cattle also, by trampling and hardening the ground, may be of service to the preservation of fruit. Paving the ground is said to be a very effectual mode of preserving fruit from the attack of the curculio, by preventing its descent into the earth, in which case it finds no winter habitation. But as this could not be done on a very extensive scale, some flat stones laid around the trees and cemented with lime, might be substituted.

In Kenrick's new and valuable American Orchardist, we find the following excellent remarks on

Gathering and preserving fruit.—"Various theories have been offered for preserving apples in a sound state for winter use, or for distant voyages. Some have proposed gathering the fruit before it is ripe, and drying it on floors before it is put up: this has been tried; apples lose their sprightly flavor, and keep no better than by some less troublesome modes. Dr. **Noah Webster** has recommended that they should be put down between layers of sand that has been dried by the heat of the summer. This is, without doubt, an excellent mode, as it excludes the air, and absorbs the moisture, and must be useful when apples are shipped to a warm climate. But apples thus preserved are liable to imbibe an earthy taste.

"Chopped straw has been highly recommended to be placed between layers of fruit; but I have noticed that the straw, from the perspiration it imbibes, becomes musty, and may do more hurt than good. When apples are to be exported, it has been recommended that each be separately wrapped in coarse paper, in the manner oranges and lemons are put up. This is, without doubt, an excellent mode. And Mr. **Loudon** has recommended that apples destined for Europe should be packed between layers of grain.

"Great quantities of winter fruit are raised in the vicinity of Boston, and put up for the winter use, for the market and for exportation. The following is the mode almost universally adopted by the most experienced. And by this mode the apples, under very favorable circumstances, are frequently preserved in a sound state, or not one in fifty defective, for a period of seven or eight months. The fruit is suffered to hang on the tree to as late a period as possible in October, or till hard frosts have loosened the stalk, and they are in danger of being blown by high winds; such as have already fallen are carefully gathered and inspected, and the best are put up for early winter use. They are carefully gathered from the tree by hand, and as carefully laid in baskets. New, tight, well seasoned flour barrels, are usually preferred; the barrels being quite filled are gently shaken, and the head is gently pressed down to its place and secured. It is observed that this pressure never causes them to rot next the head, and is necessary, as they are never allowed to rattle in moving. No soft straw or shavings are admitted at the ends; it causes mustiness and decay. They are next carefully placed in wagons and removed on the bulge, and laid in courses in a cool airy situation, on the north side of the building, near the cellar, protected by a covering on the top of boards, so placed as to defend them from the sun and rain, while the air is not excluded at the sides. A chill does not injure them; it is no disservice; but when extreme cold weather comes on, and they are in imminent danger of being frozen, whether by night or day, they are carefully rolled into a cool, airy, dry cellar, with an opening on the north side, that the cold air may have free access—they are laid in tiers, and the cellar is in due time closed, and rendered secure from frost. The barrels are never tumbled or placed on the head. Apples keep best when grown in dry seasons and on dry soils. If fruit is gathered late and according to the above directions, re-packing is unnecessary; it is even ruinous, and should on no account be practised, till the barrel is opened for use. It has been fully tried."

Making cider.—From the apple, in our country, we obtain a beverage highly useful. The wines of other countries do not differ more in quality than the cider in ours. And much of this difference arises from improper management either in grinding the apples, or, what is more common, putting the must or juice into foul casks, and neglecting or mismanaging it while fermenting.

To make the best of cider, you must have sound fruit, (no rotten apples must ever be admitted,) gathered late in the season in *dry* weather, after the middle of October if possible. They should lay in large heaps, covered from the dews and rains, about fourteen days, in which they heat, and throw off a great proportion of their indigested and insipid water, and ripen more uniformly than while on the trees. They must not be ground while they are wet either from the rain, the dew, or from the moisture thrown out by the heat produced by their laying together.

The finer the apple is ground, the more it will yield. If the mill is well fitted, it crushes the seed, and gives a peculiar aromatic bitter to the must, which becomes more and more distinguishable as the cider is longer kept. Some prefer this flavor; others dislike it, not distinguishing it from the bitter of the rotten apples, although very different from that pungent bitter, both in taste on the palate and effects on the stomach.

The pumace should be suffered to stand from six to twenty-four hours, according as you may wish to give a higher or a paler color to your cider. Its aptness to imbibe foreign tastes renders an exact attention to your vessels of great importance. New vessels, made of seasoned oak, do very well; but those which have been used are better, provided they be kept *sweet* and clean.

How to clean the casks.—When a cask is emptied rinse it with cold water *immediately*, otherwise the lees will sour, and fix an acid that can hardly be removed; and if long continued, dries on the staves so hard as to require much labor in scrubbing it off; in this case it should be whitewashed with lime (which is done by putting about one pint of unslaked lime into a barrel of common size, to which pour three or four gallons of boiling water; shake it well, giving it vent; let it stand till cool, and rinse with cold water. If it still retains the sour smell, let the operation be repeated.)

When it is rinsed perfectly clean with cold water, pour into a hogshead at least six gallons of boiling water. Roll and shake the water to every part of the cask, so as to heat it on all sides. Then pour out the water and lay your cask exactly bung hole downwards, the water running clear and entirely off; the heat in the cask will dry it perfectly. In this state bung it up as carefully as if filled with your choicest liquors, and it will remain perfectly sweet and fit for use in the following season.

It is best, however, to inspect each cask before you fill it. This is done by fixing a candle to a wire three feet long, and letting down the candle through the bung hole into the cask; you can then see every part of the inside as distinctly as the outside. If they are clean (and tight) it is not best to rinse them with water. It may appear singular to you that so much is said on a case that is plain to every one; but believe me, you may take ten times the trouble in another way, and not effectually cleanse your vessels; and unless they are perfectly sweet, it is impossible to have good cider.

The must or juice of the apple being obtained, the first object is to clear it of pumace; the second, to produce a fermentation to your palate and purpose.

To clear the liquor of pumace, most farmers do nothing more than strain it through straw. It ought to be strained through a hair sieve, or run through sand. The mischief of pumace left in the liquor, is, that it produces an *excessive fermentation*, by which more cider is injured than in any other way.

Another way to free the liquor of pumace, practised by some of our best farmers and much recommended, is putting the liquor into large open vessels or vats, with a tap and faucet near the bottom, by which to draw it off. Hogsheads, where they can be had, with one head out, will answer the purpose. In these open vessels it is to stand *till the first appearance of fermentation*, which may be sixty hours; or it will be sooner or later according to the degree of heat in the air at the time.

During this period the heaviest of the pulp sinks to the bottom; the larger and lighter parts rise to the surface in scum, where it remains until the fermentation begins; but the fermentation would involve great part of the pulp, both from above and below, into the body of the liquor, and increase the fermentation beyond our control. It must, therefore, be removed before this effect be produced. Soon after the fermentation begins, the covering on the top of the must or liquor cracks and separates, when there is not a moment to be lost before you draw it off into your casks, leaving the pulp behind.

Fermenting of cider, fining and bottling.—There are three fermentations of which cider is capable; first, the *vinous*, which produces the alcohol or spirit that gives the liquor its stimulating and exhilarating qualities; second, the *acid*, which turns the cider to vinegar; third, the *putrid*, which utterly destroys its use, and reduces it to a nauseous and poisonous liquid. The principal object in making good cider is, to stop the working of the cider as soon as the vinous fermentation is completed. The cider in our country, as it is usually managed, rarely stops at this stage. Nine times out of ten, it is far advanced to the vinegar state.

The fermentation should be slow; in order to this the medium heat of the day should never exceed forty-eight degrees of Fahrenheit's thermometer. But as farmers, generally, have no thermometers, it may be sufficient to notice, that this temperature of the air does not usually take place in our cellars before November, which generally affords the best season for making and storing cider.

To check the fermentation when becoming too violent or too long continued, rack or draw off the cider from the lees into clean casks, in which, when about half filled, should be burnt some matches of sulphur, and the fumes incorporated with the cider by shaking and turning the barrel. When the air in the cellar is fallen to forty-six degrees or lower it is fit for the reception of cider.

During the whole time of fermentation the casks must be kept full, so that the yeast, pulp, gas, or whatever you please to call that matter which rises in fermentation, may be thrown out of the cask and not return into the liquor; for if it does, it operates as yeast, renews the fermentation, and will destroy the cider.

If racking or drawing off the cider has not been done sooner, it should never be delayed longer than till February, as if suffered to stand on the lees through the summer it will most certainly injure the cider. To fine or clarify cider, isinglass, the whites of eggs, and calves'-feet jelley, are all made use of. This, however, need not be done, unless the cider is wanted for bottling or for market, as good cider will generally fine itself, in its own time.

One ounce of isinglass, as it is called, which is nothing else than fish glue, dissolved in two or three quarts of cider, and strained, is sufficient for one barrel. This must be well mixed with the cider by a stick introduced at the bung. Leave the bung out, and it will usually fine in eight or nine days, after which, if desired, it may be drawn off into bottles, or otherwise into clean casks, as it must not remain above ten or twelve days at most on the finings.

Cider when fine will be perfectly clear and transparent; till then it is not fit for bottling. The bottles must be dry; a few drops of water would spoil a bottle of cider. The corks before driving should be dipped in cider, and driven with a wooden bat, turning the nose of the bottle down, so that the cider shall come in contact with the cork, otherwise there will be danger of breaking the bottles. A tea-spoonful of brandy added to each bottle, is said to have a good effect in lessening the fermentation, and thereby preventing the bottles bursting. Bottles when put away should be laid on their sides, that the corks may be kept swollen so as to prevent any escape of gas.

If cider is to be kept in casks after May, early in the spring cover the bungs with rosin, or cement of some kind. To do this open a spile hole while the cement is laid on; otherwise no art can cover the bung effectually; the air from within will force up the cement through the smallest passage, and disappoint a thousand attempts to fill it up. When covered, and the cement cooled, make the cask tight by driving an oak spile into the hole.

"Farmers," says Mr. Lowell, "drink a miserable liquor instead of an excellent one which they might have: they obtain a reduced price for the article, in consequence of the bad state in which it is brought to market. If they should reduce the liquor into a *vinous and refined* state, before it is carried to market, they would obtain far better prices than they generally do.

"Something, too, must be allowed for the addition to their own comfort and enjoyment. With three day's labor of one man, forty barrels of cider may be sufficiently attended to, racked one or more times, the casks rinsed, and stummed with sulphur; then the farmer would never have to resort to foreign liquor to regale his friends. A good bottle of cider is often equal to the best champaigne, the most popular wine in France."

Vinegar.—The principal requisites to form good vinegar, are, 1. Contact with the air; 2. A temperature not exceeding 20 degrees of Reaumur (77 of Fahrenheit); 3. The addition of some extraneous vegetable matter to promote the acetous fermentation; and 4. The presence of alcohol. Vinegar can be made from cider, from the juice of currants, from sugar and water with a little whiskey: a cask that has been used to keep vinegar in, is the best cask to make it in. If cider is too weak, add half a pound of sugar and half a gill of whiskey to each gallon, and set the cask in the sun, covering the bung hole slightly to admit the air and exclude the dust.

Vinegar, however, is best made thus: to a quarter cask of good cider, add 4 pounds of white Havana sugar, and half a pound of argol or rough tartar in fine powder; it will be better for the addition of some lees of wine; expose it to the heat not less than 75 degrees nor more than 80 degrees, with the bung out. Twice or thrice a day, draw off a pailful, and after it has stood exposed to the air a quarter of an hour, return it into the bung hole by a funnel.

The method of imitating wine vinegar in the English manufactories, is as follows: In a long room, quarter casks of cider placed upright, side by side, raised above the floor about twenty inches, occupy all sides of the room, which by means of stoves is kept at a temperature of about 80 degrees of Fahrenheit. The top of the cask is bored full of holes; on each cask is placed a tub holding about half a bushel or more of Malaga raisins.

The sole occupation of the man who attends the room, is to go round incessantly, and draw a pailful from the bottom, and pour it upon the Malaga raisins; the cider percolates through the raisins, and runs into the cask by means of the holes in the top. This gives the wine flavor and body. The operation takes about a fortnight, according to the strength of the cider; when this is weak, sugar and powdered tartar are put in. The tartar certainly adds to the strength of the acid, and also to the vinous taste, but the acid of tartar is by no means so wholesome as the acid of vinegar. Tartar can be discovered by means of sugar of lead: the tartrate of lead precipitates; the acetate of lead is soluble.

THE PEAR TREE.—Of the pear tree as well as the apple tree, there are many varieties: as these do not re-produce themselves from the seed, and as the plant furnished by layers, cuttings and scions, are very indifferent, the pear tree is usually propagated by scions and buds. They may be grafted on quince or pear stocks. The best fruit is usually produced from quince stocks; but though finer in quality, it is not so abundant in quantity as that produced from pear stocks.

We give the following from Mr. KENRICK's select list of fruits, as contained in his New American Orchardist. Those who would be more particular, will do well to consult that book.

Summer fruit: Green Chissel, Early Rousselet, Jargonelle, St. John's, Skinless.

Autumn fruit: Andrews, Bartlett, Capsheaf, Dix, Dutchess D'Angouleme, Fulton, Gore's Heathcot, Harvard, Golden Beurre of Bilboa, Marie Louise, Napoleon, Wilkinson.

Winter fruit: Diel, Lewis, Passe Colmar.

Winter baking Pear: Catillac, Pound.

A pear tree should be left pretty much to its own growth. It may, however, sometimes be necessary to apply the knife, in which case it should be merely to keep the head of the tree tolerably well open in the middle, and to preserve its pyramidal shape, by shortening the wood on that side where it grows too luxuriantly.

Diseases.—The pear tree is liable to injury from the *slug-worm*, which usually appears on the upper surface of the leaves, in the month of July. They may be easily destroyed by sifting air-slaked lime over them. The *curculio* is also an enemy of the pear tree; and may be treated in the manner already described under the head of the apple tree. The fire blight is another serious disease which often attacks this tree.

"One reason," says Mr. GOODSELL, "why horticulturists have not made more satisfactory discoveries as to the cause of this disease is, that they have not commenced their examinations sufficiently early, and have been led to watch the progress of it after the first cause has ceased to operate.

"I am inclined to think that careful examinations will support the following conclusions.

"*First*—That the blight in pear, apple, and quince trees, is occasioned by an insect.

"*Secondly*—That it is communicated to the pistil of the flower at the time that organ is in its greatest perfection, or during the expansion of the flower.

"*Thirdly*—That it gradually spreads from the point of infection to other parts of the tree, in a manner similar to mortification in the animal kingdom.

"*Fourthly*—That it is as capable of being communicated by inoculation as the small-pox.

"*Fifthly*—That no tree has it, unless by inoculation, until it has produced flowers.

"In support of the first conclusion, so far as we have observed this disease, it has spread from the place where it first commenced in an orchard in every direction, without reference to the general course of the wind at the time; and as the quince does not come into flower until after the pear has shed its flower, it cannot be attributed to an intermixture of pollen from the pear tree.

"That it commences at the point of the pistil has been evident from every case we have examined, before the different parts of the flower are decayed. It often appears that not more than one flower in the cluster is infected: the fruit of the infected flower does not swell as the others, which continue their growth, until the mortification has by degrees descended through the stem, to the woody part of the fruit spur, over which it spreads, and ascends the stems of the remaining part of the cluster, which may readily be observed, by a discoloration of them as it advances. In this section of the country the disease will be found to have advanced thus far by the first of June, when the leaves on the fruit spur, so affected, will be found withering. After this, the rapidity with which it spreads, depends on circumstances. Where there is the greatest quantity of alburnum, or elaborated sap, the disease spreads with the greatest rapidity, which is increased by the state of the atmosphere; as in warm moist weather it progresses further than when dry and cool.

"It is not till the middle of June, that this disease begins to manifest itself to superficial observers. About this time the mortification from the fruit spurs, will have reached the limbs; and where they are numerous, and most of them affected, they will in a short time destroy the branch, so as to cut off all communication between the bark and wood. As the ascending sap passes through the sap-wood to the leaves, before it is elaborated, this communication is not cut off until later in the season, and the outer ends of the limbs remain green, until the disease has penetrated the wood; at which time the ascent of the sap is cut off, and the whole limb becomes discolored in a short time, often in the space of a few hours.

"We do not pretend to be such an adept in the science of vegetable pathology, as to be able to describe the manner in which the virus of this disease acts upon the healthy parts of the tree; but of this we are satisfied, by repeated experiments, *that it is as capable of being communicated by infection as the small-pox, or any disease to which the human family is subject.* The manner in which we have conducted these experiments is as follows: We have taken the discolored vivid matter from between the bark and wood of a diseased limb, and put it beneath the bark of a healthy tree, in some instances covering the wound with a strip of rag, which had been dipped in melted grafting wax, in others leaving the incision open; in some instances the quantity of *virus* introduced into the healthy tree was not greater than would be used to inoculate a person for the small-pox; and yet in every instance, within from three to five days, the disease has shown itself spreading the same as in a tree which had it the "*natural way.*"

"Trees do not have it the natural way until they have put forth blossoms. We have repeatedly seen young trees growing near those which were in a diseased state, which remained in perfect vigor, and this present season we have examined one which was of a large size which had never produced any blossoms before, and this year only upon one small limb, which produced one dozen bunches of flowers, nearly all of which were diseased, so that we think by the first of July the limb will have turned as black as if it had been scorched by fire.

"Amputation is the only remedy known at present. As soon as the disease is observed, the limb should be cut off below where it can be discovered, in doing which the operator should remember that the smallest quantity of *virus* is sufficient to communicate it to a healthy part, if brought in contact between the bark and the wood; he should, therefore, be careful not to use an instrument for amputation which has been used to examine the diseased parts, unless it has been thoroughly cleansed.

"We have been thus lengthy in regard to this disease because it is one of vital importance to every farmer who would cultivate a valuable orchard, or is fond of this delicious fruit."

The Peach Tree.—A rich sandy loam is the soil best suited to the peach tree. If the soil be not naturally of this description, a bushel or two of sand thrown around the root of the tree at planting will greatly improve it. Some writers say the ground should never be manured with stable dung. If the ground is very poor, let some good mould from the ditches, or hill sides, &c. be applied. Manure is said to spoil the flavor of the fruit, and to cause it to rot prematurely. The land for cherries, pears, and apples, cannot be too rich, but it is otherwise with the peach. "The largest and finest peaches I have ever seen," says an experienced cultivator, "(the heath and yellow Canada,) were raised on a soil that would not have produced more than ten or twelve bushels of corn to the acre."

Peach trees are usually inoculated on the peach stock; they are, however, sometimes propagated on the plum or almond stock. They may be planted from ten to twelve feet apart. The ground should not be stirred about them when the fruit is on; but according to some, the cultivation of the ground is highly useful at other times.

"In our climate," says Kenrick, "the peach is almost universally cultivated as a standard. They are rarely pruned at all; they are sometimes, however, renovated by heading down; this operation should be performed just before the sap rises in the spring." Another writer says, "of all the fruit trees produced in this climate, none bears pruning so freely as the peach; indeed it should be treated very much as the vine is. All those branches which have borne fruit should be cut out, if there is young wood enough to supply their places. In proof of which, he says, if you take a limb which has borne two or three crops of fruit, and observe its produce; then take another of the same tree, which has never borne at all, and the fruit on this last will be twice the size of the former, fairer, and less liable to rot. In pruning, the branches should be taken or cut out of the middle of the tree, to give more air and sun to the fruit on the outer limbs.

Peaches are either of the *free stone* or *cling stone* kind.

We give a list of the approved sorts of each, arranged according to the order of their ripening.

Free stones.—Grosse Mignone (red rare ripe), Belle Chevreuse, Double Montage, Bellegarde, Late Purple, Morrisania Pound, &c.

Cling stones.—Early Newington, Congress, La Fayette, Oldmixon Clingstone, Pavie Admirable, Heath, &c.

Peach trees are destroyed by a worm which feed on the inner bark of the tree, at its root. This worm is said to be the offspring of a fly of the wasp kind, which deposits its eggs in the bark of the root of the tree while it is yet tender and young. The remedy consists in searching for the opening in the bark at the root, and taking them out. If this operation is repeated three or four springs, the worm never after can make a lodgment there. The bark of the tree by this time becomes so hard, that the fly cannot make the puncture in order to deposit the egg, or if deposited it perishes. After the worm is cut out in the spring, draw the earth up around the body of the tree, six or eight inches above the other ground.

There are several other ways prescribed to remedy this evil. Unleached ashes applied around the root of the tree about the beginning of June, being formed into a small mound, will protect the tree where the bark is most tender. This should be levelled in October, to give the bark an opportunity of hardening. It is suggested that the wash of potash, heretofore described, might, by a proper application, at a suitable time, after the deposition of the eggs of the insect, prevent their generation.

Mr. Ellis, of New Jersey, prevents the injury arising from the worm by the use of rye straw. In the spring, when the blossoms are out, clear away the dirt so as to expose the root of the tree to the depth of three inches; surround the tree with straw about three feet long, applied lengthways, so that it may have a covering one inch thick, which extends to the bottom of the hole, the butt ends of the straw resting upon the ground at the bottom. Bind this straw round the tree with three bands, one near the top, one at the middle, and the third at the surface of the earth; then fill up the hole at the root with earth, and press it closely around the straw. When the white frost appears the straw should be removed, and the tree remain uncovered until the blossoms put out in the spring. By this process the fly is prevented from depositing the egg within three feet of the root; and although it may place the egg above that distance, the worm travels so slow that it cannot reach the ground before frost, and therefore it is killed before it is able to reach the tree.

When the *curculio* attacks the peach tree, let it be treated as before recommended.

The *yellows* is a disease of a more serious nature; for as neither the source nor the precise character of the disease is understood, it has hitherto baffled every endeavor to subdue it. The yellows is capable of being communicated from one tree to another, and the consequence is certain death. A knife, which has been used in pruning a diseased tree, will communicate it to the healthy one. It will spread through a whole orchard, like a contagion, as it is, if the trees infected be not immediately destroyed. This, therefore, is the only remedy yet known. As the time of blooming in the spring is supposed to be the period of taking the disease, all trees, when discovered to be infected, should be previously removed.

Peach trees are also liable to be injured by the bursting of the bark from severe frosts in wet winters, and the splitting off of the limbs at the fork of the tree. The first is to be prevented by planting the trees where the water will readily run off; and the second, by proper pruning and attention.

Apricots and Nectarines.—The culture of these trees is in all respects like that of the peach, and will not, therefore, be separately treated of.

The Plum Tree.—The plum tree delights in a soil like that of the peach—neither too dry nor too moist.

The varieties are propagated either by inoculation on plum stocks, or from seed. Those produced from the seed are preferred.

In favorable climates it should always be cultivated as a standard, and will then require only a little annual labor about the roots, and the removal from the head of dead and dying branches.

Some plum trees are liable to be attacked by a worm, which occasions the formation of large bunches on the limbs. These diseased limbs are to be removed and burnt, and even the whole tree if it should be badly infected, to the end that it may not communicate to others.

The best recommended sorts are—the Prescoe of Tours, Early Damson, Green Mirabelle, St. Catharine, White Perdrigon, Imperatrice, and all the Gages—Blue, Violet, and Green.

The Cherry Tree.—Cherry trees are propagated by budding and grafting, unless to produce stems or new varieties, when the seeds are sown in autumn. The soil required is similar to that for the peach. Cherry trees do not require much pruning.

The sorts to be preferred are—the May Duke, Early Black, large Black-Heart, Frazier's Tartarian, the Elton, Bleeding Heart, Cerone, Black Gean, Florence, Amber Heart, and the Morello.

The Quince.—There are several varieties of the quince, called the Apple, the Pear, the Portugal, &c. Of these, the latter is considered the best.

The quince is propagated by seeds, layers, cuttings, and suckers. But the surest and most usual way, is by cuttings.

They require a rich and moist soil, and a sheltered situation. When they are once growing, little further attention is required than to remove useless suckers, and dead or decayed wood.

Judge Line, proprietor of "White Hall Nursery," near Carlisle, Pa. has been, for nearly twenty years, devoting a large share of his attention to the cultivation of fruits and ornamental trees. His skill and taste as a horticulturist is not, perhaps, exceeded by any one in this region of country, and the deservedly high reputation of his nursery is manifested in the extensive and increasing demand for his productions from the neighborhood as well as more distant parts of the country. This fact affords strong proof of the increasing interest which our people are taking in the cultivation of good fruit, whilst it shows that they are not insensible to the importance of procuring trees whose quality is guaranteed by a proper responsibility.

From a Catalogue, &c. lately published by Judge L. we make the following extract.

APPLES.

Sine Qua Non,
Early Red Margaret or Juneating,
Early Queen,
Early Nonsuch,
Early Sweet,
Early White,
Reed's Early,
Harvest Pippin,
Harvest Sweet,
Pear Apple,
Wine Sap,
Pinnock,
Tolpenhocken,
Dumpling Apple,
Hoop,
Sweet Pippin,
Pound Pippin,
Sweet Paradise,
Hitner Apple,
Grind Stone,
Silex Apple,
Yellow Bellefleur,
Fanestock's Sweet,
Water Mellon,
Splittock,
Monroe,
Newark Pippin,
Longstem,
Russeting,
Menegere,
Red Calville,
Mehaffie's Sweet,
Whitmer Apple,
Cumberland Spice,
Esopus Spitzenberger,
Gloria Mundi,
Emperor Alexander,
Roman Stem,
Fallawatter,
Doctor or Dewitt,
Redstreak,
Monstrous Redstreak,
" Spitzenberg,
Hulbertson Nonsuch,
Red Baldwin,
Smoke-house,
Bull Apple,
Bullock Pippin,
Cart-house,
Rambo,
London Pippin,
Hewes' Crab for cider,
Newton Pippin,
Golden "
French "
Red Paradise,
Cole Apple,
Sweet Red Streak,
Hollow Core Pippin,
Dewart's,
Vandavere,
Sweet Vandavere,
Swaar Apple,
B. Doctor Apple,
Blue Pearmain,
Rhode Island Greening,
Pittsburg Pippin,
Monstrous "
Summer "
Gloucester White,
Styre Apple,
Hopbole,
Lawyer Apple,
Fall Pippin,
Mammoth,
Grey House,
Large Winter Greening,
Harrison,
Maiden Blush,
Pine Apple Pippin,
Pinnock's Red Winter,
Robinson's Large Red,
Degruchy's Noble,
Lady Apple,
Francelin Apple,
Prince's Early Harvest,
Delaware Pippin,
Chinese Double Flowering,
Logue's sweet "
Cove "
Shop Apple,
Gilleflower,
Sweet Doctor,—Sweet Crab,
Red Siberian Crab,
Yellow " "

The establishment contains upwards of fifty kinds of apples not named in the foregoing catalogue. It often happens that some varieties are comparatively scarce or small, in such cases the proprietor will always select such kinds as are of equal value and larger size, to supply orders.

CHERRIES.

Early May Duke,
Black " "
Black Tartarian,
Belle Chereuse,
Ox Heart,
Elkhorn,
American Heart,
Napoleon Bigereau,
Black Eagle,
Triumph of Cumberland,
Florence,
Elton,
Plum Stone Morella,
German "
English Kendish, &c.

PEARS.

Seckle,
Bell Pear,
Henry the Fourth,
Passe Colmar,
Oley Pear,
Butter Pear,
Beaure Colmar,
Early Brown,
Bleeker's Meadow,
Rushmore's Good Christian,
Swiss Burgamont, &c.

PLUMS.

Green Gage,
Bolmer or Washington,
Coe's Golden Drop,
Yellow Gage,
Hulings's Superb,
Prince's Gage,
Magnum Bonum,
German Gage,
German Prune,
Gourd Prune,
Bleeker's German Gage, &c.

PEACHES.

Early Newington,
Pine Apple,
Morris' White,
Early York,
Prince's Rareripe,
Lemon Cling,
Red Cheeked Meleeoton,
President,
Swalsh,
Old Newington,
Late Heath,
Early Purple,
Royal Kensington,
Claret Peach, &c., &c.

APRICOTS.

Roman,
Moorepark,
Peach Apricot,
Masculine,
Breda,
Monstrous Peach,
Bressels',
Black or Pope's, &c.

ORNAMENTAL TREES.

English Linden,
Red Twigged do.
Wolly leaved do.
American do.
Sugar Maple,
Yellow Flowering Maple,
Hackberry,
Red Flowering Maple,
Silvery Leaved do.
Silvery Abele,
Chinese Alianthus,
English Elm,
White do.
Slippery Elm,
Horse Chesnut,
Black Ash,
Golden Barked Ash,
Tulip Tree,
Balsam Poplar,
Flowering Locust, &c.

EVERGREENS.

Balsam Fir,
Norway Spruce,
Arbor Vitæ, White Pine,
Tree Box,
American Juniper,
Sabina Depressa, &c.

PÆONIES, &c.

Pæonie Mautan Banskii,
" Mautan Papavaracia,
" Whitlijii,
" Humei,
" Fragrance,
Pæonie Humilis,
" Fimbriatta,
" Siberica,
" Tenefolia,
" Officinalles, &c.
Gooseberries,
Currants,
Strawberries,
Tart Rheubarb,
Roses, Altheas, and
Shrubbery generally.

REMARKS ON TRANSPLANTING.

The apple should be planted from 30 to 50 feet apart each way; much, however, depends on the strength of the soil in which you plant your orchard. In thin slate land or gravelly soil you will find 30 feet each way an ample distance. The apple will succeed in almost any soil not too wet; a rich loam will, however, ensure the finest trees and fruit. For planting an orchard the ground should be well cultivated before and after the trees are planted, and as highly manured as the means of the cultivator will admit. It is impossible for a tree to flourish as it should when the roots are surrounded and covered with a thick soil. When the tree is isolated, as in a garden or lawn, a rich compost of earth and manure should be dug in around the tree, care being taken that no pure manure be allowed to come immediately in contact with the roots. The ground about these also, for the space of two or three feet, should be kept manured until the tree is of large size, and it would also be well to dig in a portion of manure about the roots every spring. When a tree is removed, great care should be taken to preserve the roots whole and entire; if this precaution has not been observed, the tops should be lessened in proportion to the loss sustained by the roots.

When the tree has been some time out of the ground it is well to immerse the body and roots in water for from 12 to 24 hours; this will much benefit the tree and advance its vegetation.

The holes for receiving the trees should be sufficiently large to admit the roots without crowding or bending—from 3 to 6 feet in diameter, and from 18 to 20 inches deep, according to the size of the tree. It might be well to remove the subsoil entirely to this depth, and its place filled with rich mould, well combined with compost or manure fully fermented. We would, however, prefer virgin soil or wood earth taken fresh from the woods, which can be best got in low places in thick forests, mostly made of decomposed leaves. All bruised or broken roots should be shortened and smoothly pared with a knife. Let a person hold the tree upright while the operator pulverizes the earth and scatters it among the roots—let the tree be shaken gently while this is being done, and let the earth be carefully put in around every root, even the smallest fibre; it is all important that the soil should come in contact with every portion of the root. When the hole is three-fourths filled, pour in three or four gallons of water, and after it has settled away, fill up the hole, pressing the earth around the tree with the foot. This precaution of watering ought by no means be omitted in Spring planting; earth watered in this way will retain its humidity a long time, while water poured on the surface, after the hole is filled, is very injurious, causing the top of the soil to bake to such a degree as to prevent the access of air and light, both of which are highly essential to the prosperity of the tree. Should watering be found necessary in a dry season it would be well to lay a little grass or weeds around the tree which will prevent quick evaporation as well as the baking of the ground. One of the most universal and fatal errors in planting trees is planting them too deep; we have known many fine and thrifty trees die from this cause alone; they should not be planted more than an inch deeper than they stood in the Nursery, and if the frost is likely to heave them the first season a small mound can be heaped about the stem, to be removed again in the spring.

Each tree should have a stake to which it should be tied with matting or straw bands twisted and crossed between the stake and the tree, to prevent the tree from being injured by friction. The advantages resulting from this precaution are that it keeps the tree firm so that it is not loosened by high winds and prevents the trees from growing crooked and unsightly. By attending to the preceding suggestions, we feel assured that the cultivator will be amply repaid for any extra trouble and expense by the consequent increased growth, beauty and productiveness of the tree.

GRAPE VINES.

The cultivation of this delicious fruit, says the editor of the Erie (Pa.) Observer, is receiving more attention at the hands of our citizens. No garden or even door-yard, in the absence of a garden, should be without a thrifty Grape Vine. In this climate the Isabella and Catawba varieties flourish well, and they are both abundant bearers of this most delicious and wholesome fruit. These vines can be had of all our nursery men and gardeners, and for a couple or three shillings you can procure a fine vine, or if you will wait a little longer for fruit, plant a cutting, which costs you nothing but the trouble of planting it in the ground. No householder should be without this fruit. In health it affords an agreeable and acceptable dessert, and in sickness, as we can attest from a very recent experience, it furnishes a most delicious, grateful and safe refreshment, that none can fully appreciate until the cooling juices of this delicious fruit are applied with a feeble hand to fevered lips and a burning palate. At that moment the grateful relief afforded by one stem of grapes is worth years of care in rearing them. A fruit so grateful to the sick merits culture—our wish is that in sickness and in health our citizens in town and country may have of them in abundance.

HOW TO OBTAIN GRAPE VINES.

In reply to a correspondent who desired to know "the best time and mode of grafting, or getting a start of grape-vines," the editor of the Indiana Farmer and Gardener says:

Grafting is only practiced on the vine for special reasons, and we have never had occasion to try it. We shall speak of a better mode of obtaining vines.

The best method of "getting a start" of grape vines is, by the employment of cuttings. These may be planted immediately after the spring pruning of established vines. But cuttings of native grapes are as well planted *in the fall.* The granulation, from which the roots spring, will form during the winter, and the cuttings, starting early in the spring, will make good growth the first year. Cuttings are the best, because they can be procured easily, abundantly, and cheaply; they will bear carriage to any distance, are exceedingly tenacious of life and they make thriftier plants. Cuttings may be set, either where they are to remain, (in which case several should be set to allow for failures, and only the strongest finally retained,) or they may be set in nursery rows eight inches apart. Cuttings should be inserted about eight inches deep, and have two eyes or buds above the surface. The *two* buds are merely precautionary; that if one fails the other may sprout; the one only, and that the strongest, should finally be permitted to grow.

An old and skilful cultivator of the vine says that *cuttings are the best of all modes* of securing a supply of vines. "For my part, I am for scions without roots, after many experiments. All the advantage the one with roots has over the other is, that they are more sure to live; but they will not in general make as thrifty plants."

This only objection to cuttings—that a part of them fail to root—is of little practical importance, as they are easily obtained in any quantity.

GRAPE CULTURE AND WINE MAKING.

The following letter to the Cincinnati Horticultural Society, furnished us by the author, affords a mode for making valuable vineyards for a series of years. The 2300 vines, at the distance apart stated, occupied a little less than one acre of land.—*Ohio Cult.*

CINCINNATI, Sept. 26, 1845.

Mr. President:—Upon referring to some memoranda of my father, I find among others, the following account kept of the produce of his vineyard since 1837. As a number of our members are cultivating the vine, I thought it would be interesting, as it is difficult to obtain a statement of the kind kept minutely for a series of years.

It shows the actual produce, and the certainty of the crop before any other fruit in this latitude, and the difference between the Catawba and Isabella, as to the yield and certainty. The Isabella having borne a first rate crop for nine successive years, the Catawba failing occasionally, from rot and the effect of insects.

The vineyard has a southern exposure, fronting on the Ohio river, was planted with rooted plants in 1834, and contained at that time 1775 vines, placed in rows four feet apart, and three feet distance in the row—the ground being previously trenched, and the stones taken out to the depth of two feet.

In the fall of 1837, the first crop was picked as follows:—164 bushels grapes, from which was made 667 gallons wine. At this time there were 1125 Isabella and Cape vines, yielding 113 bushels, making 469 gallons, and 650 Catawba, yielding 51 bushels, making 198 gallons.

1838, vintage, September 10, produce 327 gallons.
1839, " " 5, " 140 "
1840, " " 20, Isabella, 240 "
Catawba, 45.305 "

This year (1840) most of the Catawba rotted on the vines. From this time there were 2300 vines, about one half of each kind.

1841, vintage, September 15, 237 gallons Catawba.
" " " 274 " Isabella.
——512 gallons.

1842, vintage, September 12, 166 gallons Catawba.
" " " 319 " Isabella.
——485 gallons.

1843, vintage, September 15, 250 gallons Catawba.
" " " 306 " Isabella.
——414 gallons.

1844, vintage, September 9, 283 gallons Isabella.
" " " 349 " Catawba.
——632 gallons.

About one-eighth of the Catawba grapes were destroyed, by bees and other insects, after ripening.

The quantity eaten by three families is not taken into this account.

The ground has always been thoroughly hoed in the spring and kept free from weeds, never manured, until last winter when the ground was covered and dug in in the Spring; and from the result this season, it would pay well, as the vines are in better condition than they ever were, after yielding a heavy crop.

The vines have been trained to stakes, and the bearing wood cut out, after having borne one season, leaving two shoots trained the same season, one to form the bearing hoop or bow, and the other cut to two eyes, to propagate wood for the next year, the vine never having but the hoop and the two eyes left for fruit each year growing at the same time.

This year the ends of the vines have been nipped, and the suckers taken out four different times.

The following estimate I have made from what it has cost this year, and is not far from the actual expense, although the labor has been done by the hands doing the other work on the farm; and in making wine, extra hands were always employed. By planting cuttings, and preparing the ground by subsoil ploughing when it can be done, would lessen the expense. The price is what the wine was sold at from the press this season, and is a low estimate:

ESTIMATE:

2,300 Vines, at 6c.,......................	$138 00
2,300 Poles, at 2c.,......................	46 00
1,000 do. replaced,......................	20 00
Trenching ground and planting,..........	8 00
Manuring last fall,......................	30 00
Two months' work each year, nine years,	235 00
Extra work in making wine,..............	150 00
Interest on investments before crop,......	15 00
	$704 00
Cr.—By 4,306 gallons wine, at 75 cents,	$3,209 50
	$2,525 50

The expense of cultivation previous to the first crop is not accounted for, nor is the press, casks, &c., but the actual expense of cultivating an acre of grapes, where persons are hired to attend to other work, would amount to but very little, as but a short time is required to attend to cleaning the vines during the season.

Yours, respectfully,

WM. RESOR.

Mr. **Robert Sinclair**, (in the American Farmer, Sept. 1845) says—I have tried many sorts of European and American Grapes, and now give a decided preference to the well known Catawba grape, either for wine, table, or ease of cultivation. My vineyard contains about 160 perch in rows of grape plants, about 7 feet apart. But I approve of Maj. John Adlam's plan, of planting his rows: first, two rows 5 feet apart, and the next two 10 feet apart, which enables the owner to cart in manure, which will be wanted occasionally.—Maj. Adlam, of Georgetown, published a work in 1828, on the raising of the Grape and making of Wine, which contains much valuable information—he, in addition to 30 years experience, had collected from European writers much very useful matter, and gives it as his decided opinion, that in this climate we can make better wine, and with less labour than it can be made in Europe.

The editor of that admirably conducted journal, the (Cincinnati) Western Farmer and Gardener, in a visit to the garden of Mr. Mottier (now Mr. Sleath's) remarks:

"Here we observed the extensive vineyards of the Catawba Grape getting in fine order, and a system of such judicious pruning adopted (one of the greatest difficulties in the whole science of horticulture,) as cannot but ensure a fine and large crop to the owner, if nothing should occur otherwise to mar the harvest. The finest kinds of Strawberries are cultivated around the vines with a great promise of fruit. Mr. Sleath being of opinion that they are rather beneficial to the Grapes than otherwise, preventing a too great evaporation from the soil. We must not omit to mention that we rather more than tasted a very fine and pure wine made on the premises from the Catawba Grape, and having very much of the flavor of choice Madeira, the strength of whose spirit had been chastened, or made soft, by a voyage or two to the East Indies. We are seldom in the habit of taking any fermented liquors of any kind, but we found no results from the taking moderately of this wine, other than those of pleasant and healthy sensations; and we think that if people must take any thing of the sort, pure and light wines, diluted or otherwise, made from our Native Grapes, will prove most beneficial to them, and even have a tendency to do away with those excesses of this description in the country which are so much to be lamented by every well-wisher to his species. Probably the pleasant gusto yet remaining on our lips by recollection, of this production of our own soil, may have induced us to say more than we ought in recommendation of an article that the young, at any rate, can do without; but if we have done wrong to the temperance cause, let it be charitably attributed to the weakness of our carnal appetite in this instance."

From the American Farmer.

AN OUTLINE OF AN AMERICAN VINEYARD FROM THE START.

Mr. Editor:—The following outline is the result of years of successful experiments:

1. Select the best tested American grapes—particularly such as are found to mature well, whether the vines are young or old; if you wish such as will bear forthwith, take those

well rooted of several years standing in the nursery.

2. Plant in manner of fruit trees, ten feet each way; except the Scuppernong: 20 feet for them.

Trim in summer or early in fall, tying up one or two main stems, unchecked in length, to stakes for a year or so; after which, insert a post with two cleats nailed each side of the upper square end to hold rails or scantling for making the frame for the outspreading canopy of vines above. After the vines have started over said frame, no more trimming is necessary, except it may be to cut off any straggling branches under the canopy that all may be kept clear beneath for say 6 or 7 feet high.

3. As to soil, any will do with proper management. I have the finest of good bearing vines in almost all kinds; from the light sandy to the stiff clayey. And as to the strength of soil, there is more danger of having land too rich than too poor, as to the bearing properties of vines. As a general principle, ground that will bring good corn is plenty rich for vines, provided you dig or plough, or both, some depth and width, when the vines are set, and put manure or surface soil at the bottom of the opening, and then cover with common earth before planting, that no manure or too rich soil may come in contact with the roots to endanger their safety in case of a drought the first season after planting.

4. The best mode of keeping up due fertility of soil is this, viz: in connection with never suffering your vineyard at any time of year to become grassy or weedy, to be particularly careful to scarify the ground; and after fall frosts, that no leaves or litter from your vines blow off, or become incorporated with the soil beneath the canopies. Nature's mode of keeping up and increasing the fertility of woodlands, taught me this mode, and the very best too of manuring vineyards, or what is more than equivalent thereto.

5. The foregoing is the whole secret of having a first rate vineyard, the *ripe* fruit of which is the most healthful as well as pleasant, and can be enjoyed for several months in the year; the wines from which are in no danger of adulterations; and as to a family medicine, according to the voice of experience, and of most eminent physicians, the very best single healing one in the Materia Medica; and also an anticipator of disease in sickly places and seasons, when taken temperately, say after dinner.

A few additional little matters, and I close this off-hand hastily written article.

1. I tie my vines with elm bark, which being got in spring, are at any season ready when soaked, and outlasts any strings I have ever tried.

2. In a wet season I insert posts, with what we call *jobbers*—that is, a piece of wood say three feet long, sharpened at one end, and a strong peg inserted through the other end for raising it by a stake or crow-bar, when driven into the ground by a maul or beetle. Into the hole made thereby, insert your post, say two or more feet deep.

Posts at any time can be renewed when giving way, by propping up the part of the canopy above. Posts of any lasting wood had better be charred at the little end, so as to stand inversely from the way they did when growing as a tree. According to statements I have read in Agricultural periodicals, they will last much longer when thus inverted, or standing as it were upside down.

Pardon the hasty and desultory style of this communication, and believe me ever yours, and a hearty well wisher of all deserved success in your avocation in the best of all arts and sciences, as that of Agriculture is the foundation of all the rest.

Yours, &c.

SIDNEY WELLER.

Brinkleyville, Halifax co. N. C. Sept. 16, 1845.

Hovey's Seedling Strawberry.—This fine variety was originated by Messrs. Hovey & Co., at Cambridge, near Boston, in 1834, and has obtained the highest premiums of the Massachusetts as well as many other Horticultural Societies, for several years, as the best, taking it altogether, yet seen. Specimens were exhibited, last fall, by Mr. S. S. Jackson, measuring five inches and a half. Its blossoms are chiefly female, and must, therefore, be grown in rows near to, or alternate with the Iowa, Virginia Scarlet, or similar kinds, which will cause it to bear enormously.

A new variety of the Strawberry, called the British Queen, have this year excited much attention in London.—One of the berries raised by Mr. Stobbs, near Lincoln, weighed a little more than an ounce and a half—so that ten such Strawberries would make a pound.

Cultivation.—The early part of October is a good time to set out new beds of strawberries. In selecting a place for your bed or patch, choose a deep, rich loam, with a southern exposure. Manure it generously with stable manure that has been well rotted,—any *rich* compost that has undergone the process of decomposition will answer. Dig this in as deeply as the spade will permit, and rake thoroughly. Then lay off your ground into beds four feet wide, with alleys one and a half feet wide between them.

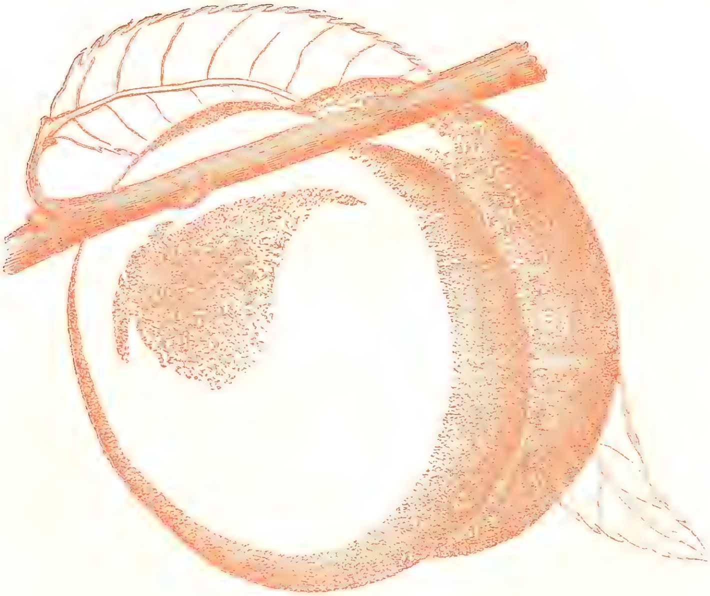
As to the selection of plants, &c. the following, from the Ohio Cultivator, is to the point:

"Select your plants from runners of this year's growth, and from beds that are young or in a healthy bearing state, otherwise many of them will be apt to prove barren and useless. As to the kinds, get any of the good sorts in cultivation that can be found in your town or neighborhood, and plant two or three kinds near together if you can get them, as they will assist in impregnating each other, and a larger crop will be obtained. If plants are to be obtained from a nurseryman, any of the following will be found excellent—(the first named is the finest of all, but should never be planted far separate from other kinds.) Hovey's Seedling, Large Early Scarlet, Hudson's, Ross', Phœnix, Keen's Seedling, Elton, Myatt's Seedling—and for variety and late bearing a few of the Red and white Alpine or Monthly."

In planting, set them out in rows two feet apart, the plants eighteen inches apart in the row. After your plants are set out lay long straw between the rows, confining the ends of the straw with pegs to prevent its being blown away. In the spring remove this straw, work between the rows of the strawberries, then lay down a fresh supply of straw, pin the ends as before advised, and you may calculate on harvesting a luxuriant and luscious crop of fruit, as the straw between the rows will serve to keep down the growth of weeds, to maintain moisture in the soil, and prevent the escape of ammonia from it.

AMERICAN APPLES.

A New York Journal says, the American Apple, take it all in all, is the most valuable fruit which grows on the earth.—We undervalue them because they are so abundant, and even many American farmers will not take the trouble to live like an English lord, though the trouble would be very little. This remark was made in view of the splendid success of Robert L. Pell, Esq., of Westchester county, N. Y., who has an orchard of twenty thousand apple trees, all bearing Newtown Pippins. By trimming and the application of the best manures, he has brought the fruit to unusual size and excellence. The apples are all picked and packed in barrels without being rolled or jolted in carts, and so arrive in the very best order for shipment. Last year they were sold in London at twenty-one dollars a barrel, and the merchant to whom they were consigned, wrote that the nobility and other people of great wealth had actually bought them by retail at a guinea a dozen. Mr. Pell has from three to four thousand barrels of the apples this year, which are sold as fast as they arrive in market at six dollars a barrel, and are all shipped to England.



THE PEACH.

This beautiful and delicious fruit will, in favorable situations, pay well for the attention and labor required in its cultivation. *Good* peaches must always command a fair price, especially near cities and large towns. Of the immense extent of the peach trade in New York an idea may be formed from the fact that a single orchard (the Reybolds' in Delaware) supplied the city, in the month of August alone with 63,334 baskets—(a basket is a short half bushel)—and in September probably more than half as many—making about 100,000 baskets from them alone. They have under yield 1090 acres of ground, containing 117,720 trees. They send their fruit directly to New York by steamboat, and are making arrangements to supply Boston next year in the same way. Calculating from all the facts we have been able to gather, (says The Tribune,) we estimate the quantity of Peaches sold in New York this season at say 12,000 baskets per day for forty days—making a total of 480,000 baskets. The price has ranged from 75 cents to $3 per basket, and we believe will average from $1.25 to $1.50—making a sum not under three-quarters of a million paid by the citizens of New York, in a season, for the single article of Peaches.

COMMERCIAL GARDEN AND NURSERY

OF PARSONS & CO.—FLUSHING, NEAR NEW YORK.

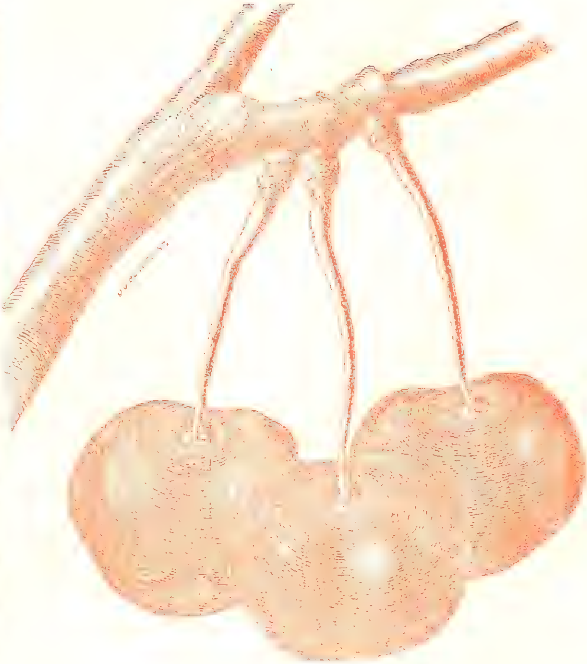
This extensive establishment, is now probably the largest in the Union, covering an area of over forty acres, and compactly planted with more than 600,000 Trees, Shrubs, Plants, &c. The very rapidly increasing taste for Horticultural pursuits, producing a demand for new and rare Fruits, Ornamental Trees, and Plants, has rendered necessary a systematized arrangement for the importation of all that is new and desirable. For this purpose, the Proprietors have inspected all the principal public and private Horticultural Establishments in Britain, France, and Germany, and have perfected arrangements, by which they will receive immediately on its appearance, every thing that is new and valuable.

☞ Orders may be addressed to the Proprietors at Flushing, New York, and Catalogues can be obtained by application, post paid, to themselves, to Parsons & Lawrence, 129 Pearl st., or Saxton & Miles, 205 Broadway, New York.

THE PEAR.

For extensive orchards, standard pear trees are to be preferred in this country. The best stocks are produced from the seeds of the Button or Chokepear. These small, austere kinds are more prolific in the plump seeds than the finer cultivated varieties; and their seedlings are more healthy and durable. Horticulturists have discovered that it is often advantageous to check the naturally vigorous habit of the Pear, by engrafting it upon some stock that will restrict its growth. This results in producing a dwarf tree, that is prone to form great quantities of fruit-buds at an early age; besides, the qualities of many varieties of the Pear are found to be improved by this change. The Quince and the Thorn are usually employed for the purpose. On the apple it will not be durable.—*Kirtland.*

CHERRIES will accommodate themselves to almost any soil. The best varieties are—Knight's Early Black, Davenport's Black, Black Eagle, Napoleon Bigarreau, May Duke.

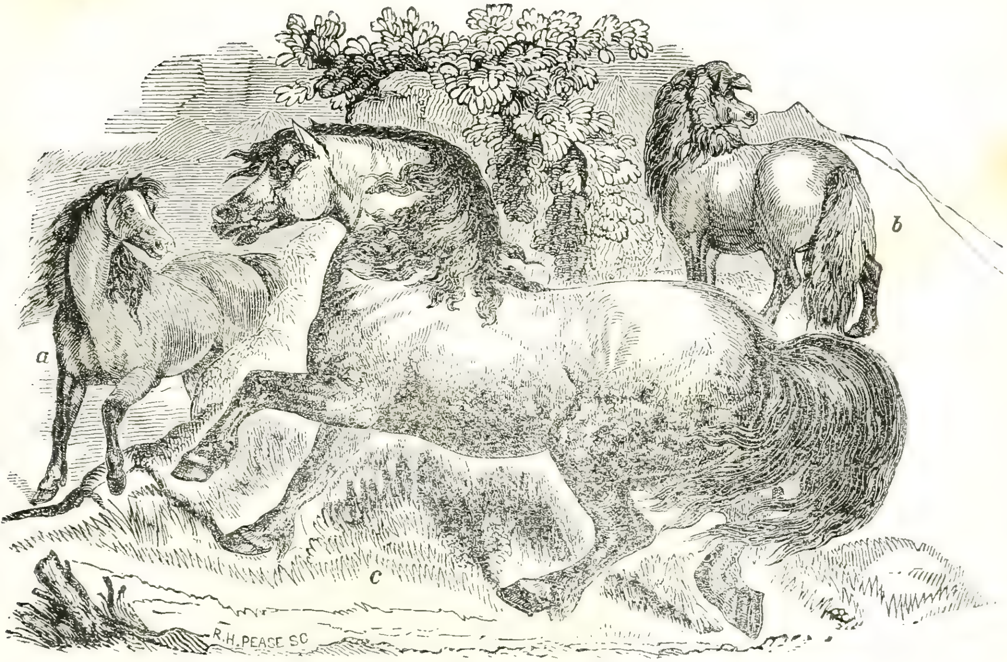


FRUIT TREES.

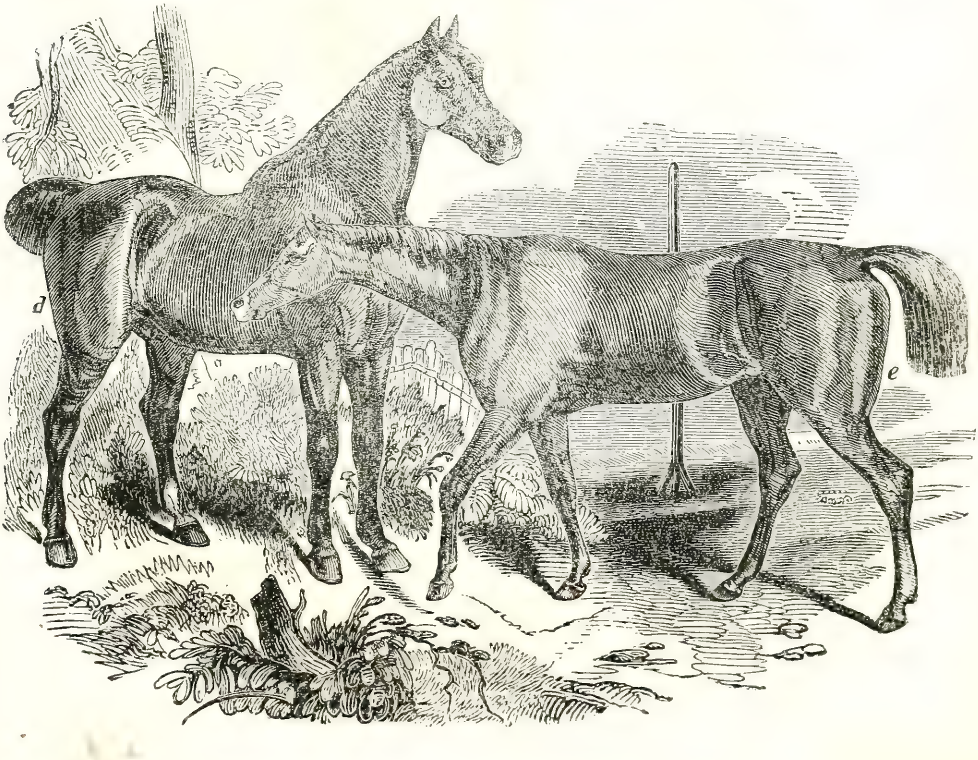
Instead of continuing the old practice of having alternate bearing and barren years for Fruit Trees, those who cultivate them would do well to note this fact: When young trees come into bearing for the first time, about the time the fruit is setting, if the most of it is taken off, and this continued for a few years in succession, leaving every year about the same quantity on the trees, they will, by the time they have become of sufficient size to be profitable, acquire the habit of bearing every year.

Productive Apple Tree.—The Boston Cultivator says, a tree on the farm of Morris Eames, Dover, Mass., grafted in 1835, produced 7 barrels in 1838—11 barrels in 1840—and 14 in 1842. Nearly all the small limbs were grafted, two hands being a day and a half in doing it. By this means the top was speedily and entirely changed.

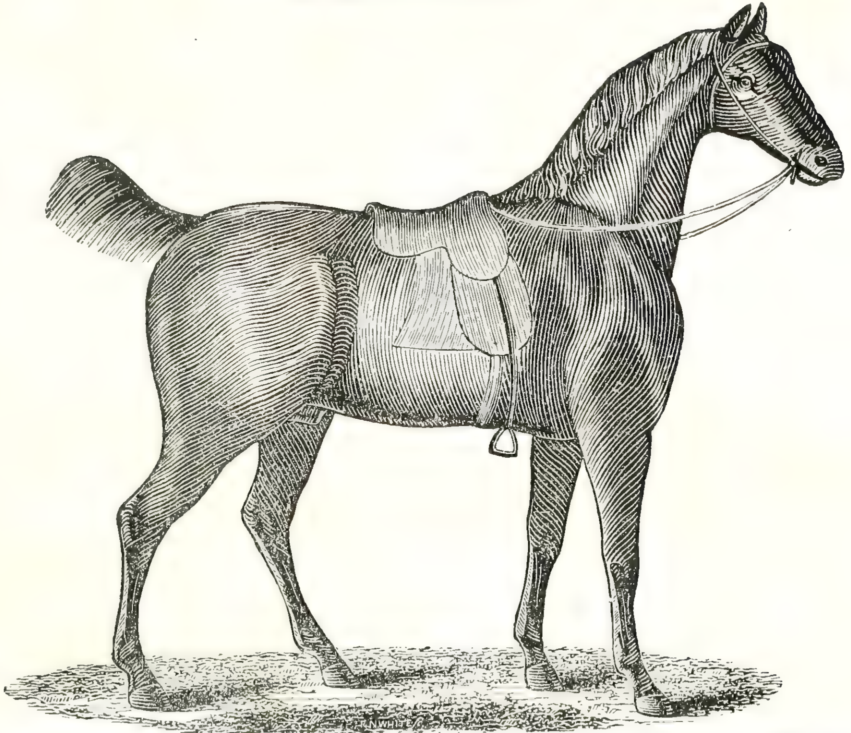
Transplanting Trees.—The fact is not so generally known as it should be, that most of our indigenous nut-bearing trees are as easily susceptible of improvement, by transplanting and grafting, as fruit trees are. The Oak, the Beech, the Walnut, and the Chesnut, may by these means be made to produce fruit far superior to any matured in an uncultivated or natural state. We have seen beech nuts, (says the Maine Cultivator,) twice the size of those ordinarily grown in the forests, from a tree of 20 years' growth in a cultivated soil.



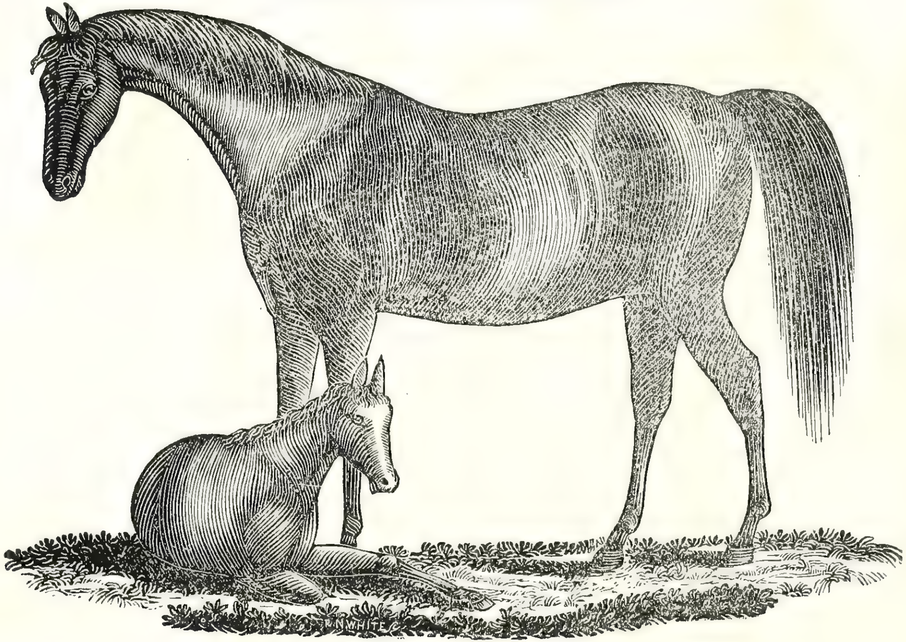
(a) Welsh Poney.—(b) Shetland Poney.—(c) English Draft Horse.—(d) Hunter.—(e) Racer.



A SADDLE HORSE.

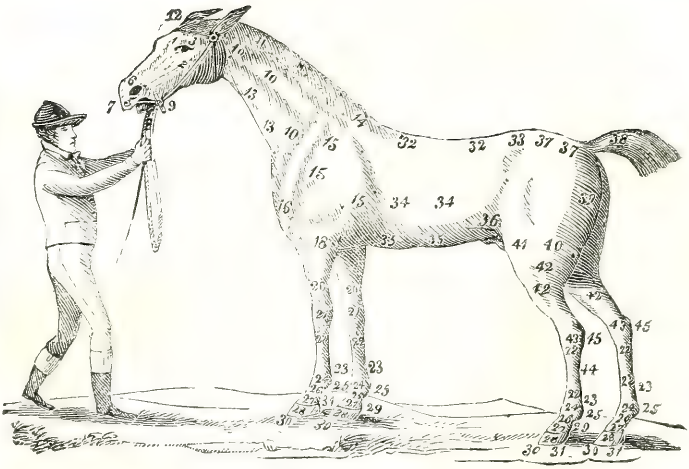


[☞ *If you want a book devoted to the subject alone,* "MASON'S FARRIER," *published by Grigg & Elliott, No. 9 N. Third street, Philadelphia, will be found to meet reasonable expectations.—It is a 12 mo. 419 pp.—cost $1*]



A BROOD MARE AND COLT.

THE AGE OF A HORSE,
As indicated by the appearance of his Teeth.



THE NAME AND SITUATION OF THE EXTERNAL PARTS OF A HORSE.

The Fore-part.

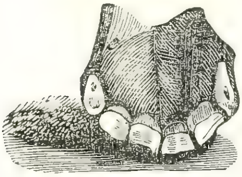
1 The Forehead.
2 The Temples.
3 Cavity above the Eyes.
4 The Jaw.
5 The Lips.
6 The Nostrils.
7 The Tip of the Nose.
8 The Chin.
9 The Beard.
10 The Neck.
11 The Mane.
12 The Fore-top.
13 The Throat.
14 The Withers.
15 The Shoulders.
16 The Chest.
17 The Elbow.
18 The Arm.
19 The Plate Vein.
20 The Chesnut.
21 The Knee.
22 The Shank.
23 The back Sinews, or Main Tendons.
24 The Fetlock Joint
25 The Fetlock.
26 The Pastern.
27 The Coronet.
28 The Hoof.
29 The Quarters.
30 The Toe.
31 The Heel.

The Body.

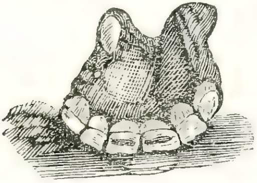
32 The Reins.
33 The Fillets.
34 The Ribs.
35 The Belly.
36 The Flanks.

The Hind-part.

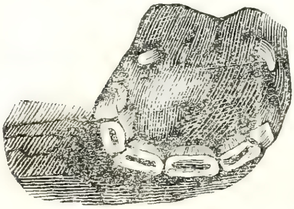
37 The Rump.
38 The Tail.
39 The Buttocks.
40 The Haunches.
41 The Stiffle.
42 The Thighs.
43 The Hock.
44 The Instep.
45 The point of the Hock.



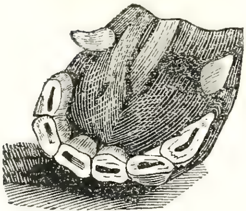
Two and a half years old.



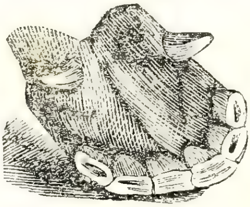
Rising three years.



Four years old.



Five years old.



Seven years old.

DOMESTIC ANIMALS.

THE HORSE.

"Of all things that the great Creator has made for the use of Man, the Horse is the most servicable." This is the judgment of Mr. Knowlson, author of the 'Complete Farrier,' &c. and he is, perhaps, correct in giving this noble creature precedence over all others in the range of animated nature. And although the comparative value of the Horse and of Horned or Neat Cattle might form a subject of controversy, it appears to us that in this country the Horse sustains about the same relation to other animals that Wheat does to the other grains, and that Neat Cattle may be viewed as occupying a relation similar to that of Indian Corn, which is supposed to be even more valuable in the aggregate than Wheat. This being the case, it follows that a book designed to be as *useful* to farmers as we hope the present one will prove, would fail in fully accomplishing its end if destitute of such a provision for the Horse as is eminently his due. We have therefore diligently explored every available source of information and gathered whatever seemed most suitable because of its practical utility. In this section of our work we flatter ourselves that we have not been unsuccessful. We have not only consulted many of the best standard works on the subject, but we have been favored with the use of the private manuscript of a gentleman who has been for several years collecting all the information within his reach in regard to the management of Horses, and especially such as relates to the cure of the diseases and remedy of the accidents to which this noble animal is liable. In prosecuting this purpose he has not only examined many books and gathered from them whatever seemed most useful, but also noted such facts as wagoners and others were enabled to furnish from the teaching of personal experience. Our collection embraces receipts that were for a long time kept secret, and a knowledge of the preparation and use of which could be obtained only at a cost beyond that which would purchase a horse of ordinary value. One of the latest works which he has examined is the "Complete Farrier," by Knowlson, who prepared his treatise after an experience of seventy years. The publisher says—"*Many of the receipts in this book are worth one hundred dollars each, and the whole are new to the world.*" Whether this estimate be too high or not, we shall not undertake to decide; but the receipts referred to are embraced among those which will be found in the following pages.

There are numerous varieties of the horse in the United States, of all grades, from the most superior, in point of form, symmetry, beauty of carriage, docility and value, to the most indifferent kinds. We look back with astonishment at the indifference manifest a few years since, by many, even among the best farmers of that day, respecting the qualities of farm stock. But that has passed—and a most commendable spirit of improvement has diffused itself throughout our whole country. No pains or expense have been spared by gentlemen of intelligence and enterprise, to procure animals—not of the horse family alone—but of all other descriptions, of the purest blood. Imported blood stock may now be found in every section of our country, and native animals in abundance, nearly if not in many instances equal to them in point of excellence and value. This mighty change has been wrought in a few years.

Although we have many different breeds of horses, all of them possessing their peculiar valuable properties, yet they are not distinguished or known from each other by peculiar names, as distinct breeds, as is the case in Europe. We have the race-horse—the saddle-horse—the coach-horse—the family-horse—the road or stage-horse—the cart or draught-horse—and the farm-horse. Those used in transportation of goods, called team, and sometimes wagon-horses, are generally heavy, fine spirited, noble looking animals, regular in their gait, steady in their pull, performing their daily task with apparent cheerfulness and good will.

Many of these useful creatures are slaughtered by sinful men, and many are ill-treated through that abominable practice and soul-destroying evil—*drunkenness;* and these poor animals which are so useful to man, are hungered, whipt, and ill-treated many other ways. A horse is agreeable for its beauty, as well as valuable for its usefulness; but neither of these things prevents wicked men from using him ill. But it is not my intention to give you a history of the horse in this little treatise, but to inform you how to cure it when out of health.

HOW TO CHOOSE A HORSE.

By Knowlson.

In my time I have bought and sold hundreds of horses, as well as had thousands under my care when unwell, but still I am at a loss how to give my readers proper directions *how to choose one;* for among all the difficulties attending the common affairs of life, there is not perhaps a greater than that of choosing a good horse; nor will this appear strange when we consider the number of niceties attending this animal, with regard to its shape and manner of going, which are so numerous that it would fill a volume to describe them. Indeed, the best judges are obliged to content themselves with guessing at some things, unless a sufficient trial be allowed.

The Eyes are the first things to attend to, and should be well examined, as the best judges are often deceived in them. *Clearness of the Eyes* is a sure indication of their goodness; but this is not all that should be attended to; the eyelids, eyebrows, and all the other parts, must also be considered; for many horses whose eyes appear clear and brilliant go blind at seven or eight years old. Therefore be careful to observe whether the parts between the eyelids and the eyebrows are free from bunches, and whether the parts round the under eyelids be full, or swelled; for these are indications that the eyes will not last. When the eyes are remarkably flat, or sunk within their orbits, it is a bad sign; also when they look dead and lifeless. The *Iris*, or circle that surrounds the sight of the eye, should be distinct, and of a pale, variegated, cinnamon color, for this is always a sure sign of a good eye.

When the horse is first led out of a dark stable into a strong light, be sure to observe whether he wrinkles his brow, and looks upwards to receive more light; for that shews his eyes to be bad. But if you observe that the dimensions of the *pupil* are large, and that they contract upon his coming into a strong light, it is almost an infallible sign that his eyes are good.

Sometimes what are called *Haws* grow on the corner of the eye, and get so large that they infect the eye, and cause the horse to go blind. You may take them out, and although it will disfigure the eye, yet it will be little worse.

In the next place examine the *Teeth*, as you would not wish to purchase an old horse, nor a very young one for service. A horse has six teeth above, and six below, in the fore-mouth, which are called the *Cutting Teeth.* At two years and a half old it changes two on the top and two on the bottom, which are called the *Nippers;* at three years and a half it changes two others, called the *Separaters;* at four and a half it changes the *Nook Teeth;* and at five years old has a full mouth; when the *Tusks*, commonly called the *Bridle-Fangs*, rise.

Horse-dealers have a trick of knocking out the nook teeth at three years and a half, to make the horse appear five years old when only four; but they cannot raise the tusks. At six years old the *Nook*

Teeth are a little hollow, and at seven there is a black mark, like the end of a ripe bean. Afterwards you will observe the flesh to shrink from the teeth, which grow long and yellow.

Horse-dealers have also a method which they call *Bishoping a horse's mouth;* that is, filing the tusks shorter, rounding them at the ends, taking a little out of the nook teeth, so as to make them rather hollow, and then burning them with a hot iron. I was hired by Anthony Johnson, of Wincolmlee, Hull, as farrier to a number of horses that were going to the city of Moscow, in Russia, for sale, and we had a little grey stoned horse, called *Peatum*, that was seventeen years old, the mouth of which I bishoped, and he passed for six years old, and was the first horse sold, and for 500 pounds English money! I only mention this as a caution to horse-buyers.

The *Feet* should next be regarded; for a horse with bad feet is like a house with a weak foundation, and will do little service. The feet should be smooth and tough, of a middle size, without wrinkles, and neither too hard and brittle, nor too soft; the *Heels* should be firm, and not spongy and rotten; the *Frogs* horny and dry; and the *Soles* somewhat hollow, like the inside of a dish or bowl. Such feet will never disappoint your expectations, and such only should be chosen.

Particular regard should be had to the *Shoulders;* they should not be too much loaded, for a horse with heavy shoulders can never move well; and on the other hand, one that has very thin shoulders, and a narrow chest, though he may move briskly so long as he is sound, yet he is generally weak, and easily lamed in the shoulders: a medium should therefore be chosen.

Be careful to observe the creature's *Motions*,—that the *shoulders*, *knees*, and *pasterns*, all act together, and have but one spring of motion, for in that case alone can they be said to move well.

The *Limbs* should be free from [*]*Splents* and [†]*Windgalls.* The *Knees* should be strait, and not bending, or what is called a calf's knee: the *Back-sinews* strong and well braced: the *Pastern Joints* clean, and free from swellings of all kinds; and the *Hocks* lean and dry, and free from [‡]*Spavins*, [§]*Corbs* and *Flatulent Tumors.*

The *Body*, or *Carcass*, should neither be too small nor too large. The *Back* should be straight, or have only a moderate sinking below the Withers: for when the back of a horse is low, or higher behind than before, it is both very ugly and a sign of weakness. The back should also be of a proper length. The *Ribs* should be large, the *Flanks* smooth and full, and the *Hind-parts*, or *uppermost Haunches*, not higher than the shoulders. When the horse trots before you, observe if his haunches cover his fore-knees. A horse with a short hind-quarter does not look well.

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[*] There are four kinds of Splents; viz. The Bone Splent, the Blood Splent, the Osselet, and the Horn Splent.

[†] Windgalls are soft Tumors, seated on either side of the Fetlock Joint.

[‡] There are two kinds of Spavins; viz. The Blood Spavin, which lies in the joint of the hind leg, something like a Windgall, going quite through the joint, and is then called a Thorough Pin; and the Bone Spavin, which lies just below the joint, on the inside, and is called by dealers a Dry Knot, or Jack.

[§] A Corb lies on the back side of the hind-leg, near the lower part of the joint.

The next thing to be regarded in a horse is his *Wind*, which may be easily judged of by the motion of his flanks. A broken-winded horse always pinches in his flanks, with a very slow motion, and drops them suddenly, which may be easily perceived. Many horses breathe thick that are not broken-winded; indeed, any horse will in foggy weather, or if foul fed, without sufficient exercise; but if a horse has been in good keeping, and had proper exercise, and yet has these symptoms, there is some defect, either natural or accidental; such as a narrow chest, or some cold that has affected the lungs.

There are other particulars that should be observed in choosing a horse. If his *Head* be large and fleshy, and his *Neck*, thick and gross, he will always go heavy on the hand, and therefore such should never be chosen. A horse that has his *Hocks* very wide, seldom moves well, and one that has them too near will chafe and cut his legs by crossing them. *Fleshy-legged* horses are generally subject to the Grease, and other infirmities of that kind, and therefore should not be chosen.

The *Temper* of a horse should be particularly attended to; because if his temper be good, it greatly augments his value, and if bad, it exposes him to many accidents. It is difficult to discover the temper of a horse without a proper trial, which should always be obtained, if possible. *Fear* is an impediment which greatly lessens the value of a horse; for a fearful horse endangers both himself and his rider. Almost every day affords us melancholy instances of persons being hurt or killed by fearful horses; and many horses are utterly spoiled by accidents that happen from their fearfulness. A fearful horse may be known at first sight by his starting, crouching, and creeping.

A *hot* and *fretful* horse is also to be avoided, but the buyer should be careful to distinguish between a hot, fretful horse, and one that is eager and craving. The former begins to fret the moment he is out of the stable, and continues in that humor till he has quite fatigued himself; and the latter only endeavors to be foremost in the field, and is truly valuable; he has those qualities that resemble prudence and courage; the other those that resemble intemperate heat and rashness.

When dealers have had a horse some time in their stables, they exercise him with a whip two or three times a day; so that when a Chapman goes to look at him, they have only to stir their hand with the whip in it, and it is hard to say whether the horse be lame or not, it being so fearful of a drubbing, that a good judge may be deceived.

A horse that goes with his fore-feet low is very apt to stumble; and there are some that go so near the ground that they stumble most on even road; and the dealers, to remedy this, put heavy shoes on their feet, for the heavier a horse's shoes are the higher he will lift his feet. Care also should be taken that the horse does not cut one leg with the other. A horse that goes near the ground will cut the low side of the fetlock joint, but one that goes high cuts below the knee, which is called the *speedy cut*. A horse that lifts his feet high generally trots fast, but is not the easiest for the rider. Some horses cut with the spurn of the foot, and some with the heel; but this you may soon perceive by their standing; for if a horse points the front of his foot inward, he cuts with the spurn, and if outward with the heel.

These few instructions may be of use in purchasing horses; but I advise every one to get some experimental knowledge of them before he trusts to his own judgment, for the dealers have so many arts to hide the defects of their horses, that the best judges are often deceived.

DIRECTIONS FOR MANAGING A HORSE ON A JOURNEY.

In the first place, find out whether the horse is in health, and has been properly fed and exercised; for when a horse is flushed up, and has had no exercise, he is very unfit for a journey. Before you set out be careful to observe if his shoes are fast, and if they sit easy; also whether he cuts before or behind, or interferes, as it is called. If a horse cut with bad shoes he will probably do it with new ones, notwithstanding what horse-dealers may say to the contrary.

If your horse's back inflame by the rubbing of the saddle, wash the part as soon as you perceive it, with salt and water, or vinegar and water, and have the stuffing of the saddle altered so as to remove the pressure from the part affected: but if the skin be broken before you perceive it, the injured part should be washed with a mixture, composed of equal parts of extract of lead, spirits of wine, and water. You must look well after his back, and walk sometimes, in order to ease him, especially when going down a hill.

It often happens, especially to young horses, that the legs swell, or become gourdy, as farriers call it, with travelling; and more frequently when a horse cuts. It is also observed that the hind-legs swell oftener than the fore-legs, because the fore-parts stand highest in the stall, and consequently the greatest stress lies on the hind-legs. The best method of prevention is to wash the legs with warm water every time you bait, by which means the disease will be prevented, and much time, trouble and expense saved. Soft warm water that will bear soap, is as good for the purpose as it can be made by any addition, and washing the legs with it, when made pretty warm, will seethe out the sand and the dirt, open the pores, give circulation to the blood, much defend the juices in these depending parts, and prevent other disorders. You should also see that your horse has a wide stand, good dressing, and proper bedding, as these things will be of the greatest use in preventing the limbs from swelling.

Few grooms dress a horse properly, but it should be remembered that he who intends his horse to perform his duty well, must take care that he is well cleaned; and as nothing is more conducive to health than friction, his skin should be rubbed till the whole is of a glowing heat, and then with proper feeding he will always answer his master's expectations.

Nothing is of more consequence in travelling than to take care that your horse has water at proper times and in proper quantities. When a horse travels he perspires considerably, especially in hot weather, and should therefore be allowed to drink a little more than usual, as opportunity offers, which will refresh him greatly; but never suffer him to drink much at a time, for if you suffer him to drink his fill he will be dull and sluggish afterwards, besides the harm he may receive from drinking too much cold water when he is hot. When you come near the place you intend to bait at, either at noon or night, that is, within a mile, or a mile and a half of it, you may suffer him to drink more freely, going at a moderate trot afterwards, by which means the water will be warmed in his belly, and he will go in cool. Observe, however, that if there is no water on the road, you should never suffer your horse to be led to water, or to have his heels washed, after you have arrived at your inn, but let him have luke-warm water when he has stood some time in the stable. Much mischief has been done by imprudent riders, who after travelling hard, have suffered their horses to drink as much as they would just at going into the town, or inn where they intended to lie.

It is a general rule that when any extraneous body, or foreign matter, such as sand or gravel, is lodged in any part of the animal's body, it must be extracted as soon and as easily as possible. When gravelly matter has got into the quick at a nail-hole, or any other aperture, it ought to be removed as soon as possible, but with as little loss of substance as the nature of the case will admit of, for it is a folly to cut and pare away the hoof as some ignorant farriers do; because by that means they increase the evil instead of removing it, as it is a considerable time before the breach is repaired, and till that is done the same part is likely to admit more gravel. So much, therefore, and no more, of the hoof should be taken away as is absolutely necessary, viz. till the blackness or discoloration vanishes; then the wound should be dressed with the following balsam.

1½ oz. of Gum Benjamin.
½ do Balsam of Peru.
6 drams of Myrrh.
3 do Gum Guaiacum.
3 drams of Storax.
3 do Socotrine Aloes
3 do Frankincense.

Powder the ingredients that will powder, and put them all into a bottle with one quart of spirits of wine, and let them stand warm for eight or ten days, shaking the bottle up every day. This is an excellent balsam for green wounds, and no person that keeps valuable horses should be without it. Apply it warm to the wound, dipping a piece of tow or lint into it, and fastening it on to the part out of which the gravel or thorn has been taken, and renew it as it grows dry.

Sprains and twistings of the joints sometimes happen on a journey without any sensible heat or swelling, so that farriers often mistake where the ailment lies. The place must therefore be carefully sought for, and if you cannot find it, do not begin to doctor where there is no grievance. It may be a slight rheumatic affection, and go off of its own accord. In a sprain of the back sinews, be careful not to lay on any thing hot or blistering while on your journey, if you can avoid it.

A horse is often seized with the Gripes on a journey, the best and shortest cure for which is the following.

6 drams of Tincture of Opium.
2 oz. Olive Oil.
1 oz. of Spirits of Sweet Nitre.

Mix the above in half a pint of mint-water, give it to the horse, and at the same time bed him well, that he may lie down to rest, and be careful not to give him cold water for a day or two after.

A horse that is subject to scouring, or purging, upon the road, has what is called a washy constitution, and such horses seldom bear hardships well, because the aliment passes off before it is thoroughly digested, which is a sign that the fibres of the stomach and bowels are lax; therefore such horses should not be chosen. The best method of curing this disorder is, to keep the horse chiefly on hard feet, and to give him proper exercise, also adding a little of the following composition to each of his feeds.

Aleppo Galls, finely powdered.
Irish Slate, in powder.
Japan Earth in powder.

Mix these all together, and put them into a bladder for use. Sprinkle a little water on the horse's oats, rub them awhile, and then sprinkle about half a spoonful of the powder upon them, and if he have not a very squeamish stomach he will eat them as well as usual.

But remember to proportion the quantity of the powder to the degree of the disorder, or you may make him too costive, which will be as bad as the other extreme when the horse's constitution shall require his being laxative rather than costive.

When a horse purges upon the road, occasioned by foul feeding, or catching cold, give him the following.

4 oz. of Venice Treacle.
2 do. Armenian Bole.
1 oz. of Japan Earth.
1 do. Powdered Ginger.

Make these up into four balls, and give them night and morning.

When a horse has got a cough by catching cold, give

4 oz. of Cordial Balls.
1 do. Elecampane Powder.
1 oz. of Liquorice Powder.

Give all together in warm ale, fasting, and to fast two hours after.

Before I conclude, I will give you the horse's address to his rider, (from Mr. Bracken's treatise,) which is well worth observation.

Up the hill spur me not;
Down the hill ride me not;
On the plain spare me not;
To the Ostler trust me not.

DIRECTIONS FOR RIDING.

If people who have young horses would take a little pains with them at a year old, and halter them and make them tractable in hand, and at two years old put the bridle on, endeavoring to get them a mouth, and to make them submissive, their labor would not be lost. A horse should not be ridden till he is three years old, and care should be taken while he is breaking to cut his mouth as little as possible with the mounting-bridle; for when the mouth is much cut, it grows hard and horny afterwards, which hinders the animal from yielding to the pressure of the reins. When a horse is left at liberty till he is four years old, he will be very restive and stubborn.

Most experienced riders hold the bridle tight when they discover the horse to be frightened, whereas, on the contrary, they should let the reins lie loose on his neck, and he would quietly pass the object that offends his eye. Others turn the horse out of his track, and endeavor to make him face the object; but this method seldom has a good effect. When a horse starts at any thing, keep him in the road, and hold his head on the contrary side to the thing he starts at, pressing your legs tight against his sides, by which means he may be led, for a horse will not always be forced up to what has frightened him: gentle methods generally operate better than severe ones. The above method may perhaps be unnecessary in a managed horse, but even such a one should be made to look another way at the time of passing, unless it is something you wish him to become accustomed to the sight of. A horse whose fear arises from not being accustomed to objects should not be treated in this manner, because his starting is merely owing to an active and lively disposition.

The best way to reconcile a horse's ear to the sound of a drum, is by beating one near him at the time of feeding; but when you are learning him to bear this, or the firing of a gun, do it at some distance at first, and by that means you will not only familiarize him to it, but make it pleasant as a forerunner of his meat; whereas if he were forced he might start at it as long as he lived. May not this method be applied to his starting at other things, and show that it would be better to suffer him, provided he does not turn back, to go a little from, and avoid an object he dislikes, and to accustom him to it by degrees, convincing him that it will not hurt him, than to punish him?

It is a common supposition that a horse fears nothing so much as his rider, but this supposition is not true; for it is no wonder that a horse should be afraid of a loaded wagon. May not the hanging load seem to threaten to fall upon him? To mitigate such timidity, press your leg hard on the opposite side, turning his head at the same time, and he will quietly pass.

Is it not natural to suppose that when a horse is driven up to a carriage that he starts at, that he conceives himself obliged either to attack or run against it? How can he otherwise understand his rider when he spurs him on with his face towards it? A horse is easily alarmed, for he will even start from a hand that is going to caress him; therefore he should not be forced to that which he dislikes; for, if he once gains his end, he will repeat that which has foiled his rider. The proper way is to use him to some tone of voice which he may understand as an expression of dislike to what he is doing, for in all horses there is a spirit of opposition.

When you meet with a carriage on the road which you think will frighten your horse, if you once let him know he is to pass it, be sure you remain determined, and press him on, especially when part of the carriage is past, for if he is accustomed to run round and go back when he is frightened, he will certainly do it if he finds by your hands and legs slackening that you are irresolute; and this at the most dangerous point of time, when the wheels of the carriage take him as he turns. Remember not to touch the curb rein at this time, for that would certainly check him. Ride with a snaffle, and if you have a curb, only use it occasionally. Choose a snaffle that is full and thick in the mouth, especially at the ends where the reins are fastened. To regulate the management of the curb is a nice matter —some people apply the weight of the arm where only a slight turn of the wrist is required.

Some people think the bridle has the chief power over the horse, but it has not; for instance, if the left spur touch him, and he is at the same time prevented from going forward, he has a sign which he will soon understand, to move sideways to the right. In the same manner he moves to the left if the right spur is closed to him; and afterwards from fear of the spur he obeys a touch of the leg, in the same manner as a horse moves his croup from one side of the stall to the other when he is touched by the hand. In short, he will never disobey the leg unless he becomes restive. By this means you will have great power over him, for he will move sideways if you close one leg to him, and forward if both; and even when he stands still, your legs held near him will keep him on the watch, and with the slightest unseen motion of the bridle upwards he will raise his head and shew himself to advantage.

On this use of the rider's legs in the guidance of the horse's croup are founded all the airs, as riding masters call them, by which troopers are taught to close or open their ranks, and indeed all their evolutions.

When a horse starts and is flying on one side, if you put your leg on that side it will stop his spring immediately, and he will go past the object he started at, keeping straight on, or as you choose to direct him; and he will not fly back at any thing if you press him with both your legs.

You must keep his haunches under him when going down a hill, and help him on the side of a bank more easily to avoid the wheel of a carriage, and to approach nearer and more gracefully to the side of a coach or horse-man.

When a pampered horse curvets irregularly, twisting his body to and fro, turn his head either to the right or left, or both alternately, but without letting him move out of his track, and press your leg to the opposite side: he cannot then spring on his hind legs to one side, because your leg prevents him, nor to the other, because his head is turned that way, and a horse does not start and spring the way he looks.

The above rules may be of some use to inexperienced horsemen, by shewing them that something more is needful than what is taught by the breakers, and that force will seldom, if ever, make a horse subservient to his rider.

COMPILER'S PREFACE.

In the composition of this work, an effort has been made to exhibit a distinct view of the essential phenomena and principles pertaining to the various subjects which it embraces. The object has been to give a digest of facts and established principles, rather than of opinoins and points of disputation. The brute creation are, in general, liable to fewer maladies, or complaints, than mankind; and as their diseases are, with some exceptions, less complicated, they are of course more easily relieved. Many of the diseases which afflict the horse might be prevented by more care; it being certain that these are often the result of the negligence or erroneous treatment of their owners. They are either exposed too much to the rigor and changes of the weather, or they are gorged with food, or denied a sufficient quantity, or supplied with such as is unwholesome.—Hence we learn the chief causes of their maladies. It would be better to learn to prevent, than to cure. Although many diseases incident to our domestic animals might be prevented by care and vigilance, yet they will sometimes get sick, under the most favorable circumstances, and for this end this treatise is prepared. The best authors have been consulted for enumerating the symptoms of diseases—and it is well known, that so nearly allied is the true art of Farriery to those of Physic and Surgery, that it never can be perfected but on similar principles; therefore, the treatment will be found to be in strict accordance with the best authors on the practice of Medicine and Surgery.

Though many useful observations and remedies may be picked up from various authors, yet, for the most part, their method is irrational; their medicines, in general, are a strange compound or jumble of various and discordant ingredients, and unknown to most readers. Authors have been consulted, so far as their receipts have been found to answer the desired purpose. A great many receipts have been procured from gentlemen who have had a long experience in the treatment of horses, and are not to be found in books.

The order that has been observed in the succession of the various subjects is, probably, as natural as that obtained by any of the modes of systematic arrangement usually pursued in works of this kind.

SIGNS OF DISEASE IN HORSES.

The first symptoms of indisposition in these creatures is, their loathing their food; and whenever this takes place, the master of the beast should take alarm, and endeavor to find out the cause, that a timely remedy may be applied. In order to do this, observe if he looks wild and haggard, or dull and stuipd;—also, whether his ears are cold or warm; his mouth hot, foaming, dry, or clammy; or if the hair about his flanks is rough and staring; and his dung hard, or black, or of a greenish caste; or his urine pale and like water: from which appearances you will be enabled, in some measure, to judge of the nature of the complaint, and of the consequences with which it is likely to be attended.

When a horse, that has been long ill, stails without striding, or even without drawing his sheath, letting the water drop from the skin, it is almost a sure indication of death; unless, as is the case with some horses, they have been accustomed to stall in this manner when they were in health. It is likewise a bad sign when the hair on his skull, or that on his tail, can be easily pulled off. Another dangerous symptom is, that if a horse never lies down during his illness, or if he does, starting up again immediately; such horses seldom recover.

When the eyes of a horse are subject to weep, and he hangs down his head and appears heavy; stumbles as he walks, and is slow, though he used to be lively and vigorous; never minds other horses; frequently lies down and gets up again; looks towards his flanks, and is indifferent and mindless of what is done about him, that horse is in danger.

But, to speak more particularly, if a horse is heavy in the countenance, much scoured or very costive, short of breath, or troubled with a hollow cough, works in the flanks and hangs down his ears, it is a fever; and sometimes these symptoms are the forerunners of the staggers.

When a horse turns his head back frequently to his right side, it indicates some obstruction or disease of the liver; but when he puts it down, almost under his belly, it is a sign that he is troubled with worms or bots; or, that he is afflicted with pain in his bowels from the cholic, or some other cause.

A stinking breath, or foul matter proceeding from the nostrils, indicates an ulcer or imposthume in the head; and if the matter is black, white, or yellow, and very offensive, it is a fatal sign, as it shows that the glanders, or a consumption of the lungs, are the occasion.

The breath, or body being very hot, indicates a feverish disposition, or a preternatural heat at the stomach; and the tongue hanging out, and being swelled, betokens an inflammation of the liver, or some other of the principal viscera.

The strangles occasion a horse to heave violently in the flanks, as likewise do most feverish complaints. Sometimes, however, this symptom is owing to the horse's wind being touched, or broken.

A swelling under the throat, attended with a continual propensity to cough, is a sign that the glanders are to be feared. If the swelling is about the root of the tongue, perhaps the strangles are the sole cause of it; and if there is nothing but little knots, like wax-kernels, they may have been occasioned by a common cold, without indicating any disease whatever.

Whenever a horse appears scabby, and loses the hair from his body and neck, it is a certain sign that he has got the manger ; and ulcers, full of knots, spreading about the veins, characterize the farcy or canker.

When the left side swells without any apparent external cause, there is reason to suspect that the spleen is diseased. The cholic will sometimes occasion a tumor in the flank, and it is a common case to see the belly and legs of such horses as are inclined to be dropsical, swell, and become much larger than they were in a state of health.

When a horse's coat stares, and is rough, it may be owing to his being badly clothed and looked after, but is not unfrequently the effect of a bad stomach, or the symptom of a foundering in the chest.

Leanness and gauntness are generally accompanied by hide-bound, inflammation of the liver, chest, foundering, worms, cholic or the jaundice. Stailing with difficulty is a symptom of the stone or wind cholic; if the urine be thick, and of a blackish color, it indicates that one or both the kidneys are diseased. Trembling is indicative of a fever, particularly when a horse shivers violently after drenching. Scouring indicates great heat in the liver; and costiveness is a sign of the jaundice, or other disease of the gall and liver. If you see a horse frequently striking at his belly, you may conclude that he has got the cholic ; but if, at the same time, he frisks his tail, it betokens his being infested with worms or bots.

When a horse, that has been some time sick, stails clear, and there is no sediment formed therein on its being set by, it is rather a dangerous symptom ; but if it turn of a yellow or reddish color, and has a cloud swimming in it that is neither black nor earthy, and deposites a brick-dust like sediment, smelling strong at the same time, it is a good sign in general, and is frequently the prelude to a speedy recovery. If, at different periods of the disease, it varies greatly, sometimes having an healthy aspect, and at others quite the reverse, there is danger to be apprehended, as it is a sure indication that there is a considerable degree of malignity in the disease. The best appearances of a horse's urine are—a yellowish color, a thickish consistence, a strong smell, and penetrating quality; all these betoken health and vigor, whereas the contrary of any of these indicate approaching disease. But there is nothing by which an intelligent person can judge better respecting the health of his horse, than by their dunging: for the color and consistence of a horse's excrements are sure indications of the inward state of his body, and ought to be well attended to when he is in his best health and at best feeding, that when he is found to alter therefrom in any particular, a judgment may be the better and more clearly formed respecting his healh or sickness. The dung of a horse that is clean, well fed, and free from disease, will ever be found clear, crisp, and of a pale yellowish hue, hanging together, and not easily separating more than as it is broken in falling to the ground by its own weight, and is of such a consistence that it will be a little flatter by its fall to the ground. If his first and second dung be well colored, and yet fall from him in round pellets or scyballs, and the rest be good, there is no harm to be dreaded, as this is an indication that he has been eating hay lately, which will always produce this effect; but if all his dung is of that hard kind, it betokens foul feeding, and that he has eaten too much litter or hay, and too little corn. When a horse's dung is voided in round hard pellets, of a dark blackish brown color, it discovers inward heat of the body; if it be greasy, it is a sign of great foulness. Again: if the dung be strong and hard, it indicates that his heats have been too violent; and if care is not taken to prevent, costiveness will ensue. If it be pale and loose, it shows he has had too much moist and corrupt feeding, or that his body is inwardly cold.

After all that can be said, the most experienced farrier will frequently find himself at a loss to distinguish one disease from another, as he has nothing to assist him in making the discovery but his own judgment, and such symptoms as are most predominant at the time, many of which are common to several diseases. It is well, however, to be acquainted with all the principal symptoms with which the diseases of this noble animal are accompanied.

SWELLED TONGUE.

Symptoms.—This disease may be known by a violent fever, difficulty of breathing, loss of appetite, the head and throat greatly swollen, the jaws stiffened, the tongue swollen and looking like that of a person having the yellow fever or small pox; the pulse will beat fifty strokes a minute.

Cause.—It may arise from some irritation of the tongue, or wounds, bruises, &c., or it may be produced by atmospheric vicissitudes, or the influence of cold and damp atmosphere.

Treatment.—General blood-letting, promptly and decisively practiced, is indispensable; much advantage may also be derived from scarrifying the upper part of the tongue, and still more from making an incision into its substance along the middle,—or use the following wash:—

Sugar of Lead, 4 oz.—Bole Ammoniac, 4 oz.—Burnt Alum, 8 oz.

Put the whole into three quarts of good vinegar, and wash the mouth two or three times a-day.

LAMPAS.

This is an unnatural prominence of the fleshy bars crossing the roof of the mouth, just behind the upper incisive teeth.

Treatment.—All that is required is to lance the gums in cases when the animal manifests uneasiness or pain, by refusing to eat his hay, and especially his corn, as usual, and give him scalded oats or bran mashes,—or rub the swelling two or three times a day with half an ounce of alum, and the same quantity of double refined sugar mixed with a little honey—or, burn with a hot iron.

BARBS.

Barbs are small excrescences under the tongue, which may be discovered by drawing it aside, and are cured by cutting close off, and washing with brandy, or salt and water.

GIGGS.

Giggs are little swellings or bladders, frequently observed on the inside of the lips and palate. They may be cured by slitting them open with a lancet, and washing them afterwards with salt and vinegar.

DYSENTERY OR BLOODY FLUX.

This is a disease that horses are not much subject to.

Symptoms.—It is attended with violent pain of the bowels; a constant inclination to dung, and generally more or less blood in it; the stools are at first greasy and frothy, afterwards they are streaked with blood.

Cause.—Cold and dampness, sdddenly succeeded by warm weather, may be regarded as a very common exciting cause of this disease.

Treatment.—Give a pint of flaxseed oil, and after the lapse of three or four hours give an ounce of laudanum, and repeat every three or four hours—or take of water two pints, the whites of two dozen eggs, beat them well together, and add one pound of sugar.

INFLAMMATION OF THE INTESTINES.

Symptoms.—This disease is frequently ushered in, and always accompanied by fever; the horse is restless, loses his appetite, the mouth is dry and hot, the inner membranes of the mouth, nose, and eye-lids are often redder than natural. As the disease advances the pain increases, so as to force the horse to lie down and rise again frequently; and when very violent, he kicks at his belly, or looks around at his sides, pawing his litter very frequently; the pulse is usually small and hard; breathing is quickened; the extremities are alternately hot and cold, but continue longer cold than hot, and the animal is costive; sometimes pain may force away a few hardened balls of dung, but the principal contents are retained.

Cause.—Excessive and long-continued exertion, and irregular feeding; obstructions, and stimulants of various kinds within the bowels.

Treatment.—In the commencement of this disease, prompt and efficient blood-letting is the remedy upon which our hopes of success must be mainly placed.—The first bleeding should be carried to the extent of producing a decisive impression on the system.—After the violence of the disease has been thus checked, light bleedings should be repeated from time to time, so as to keep up the impression made by the first.—Two gallons of blood may be taken,—or bleed until the horse is likely to faint.

In the early stages of the disease laxative injections ought to be used, or advantage may be derived from copious injections of warm water, rendered mucillaginous by starch or flaxseed, into the bowels. After the blood-letting give half a drachm of opium, and one-and-a-half drachms of calomel, made into a ball with syrup, every two hours until he is eased of pain. As soon as the pain of the bowels is allayed, a pint of castor or linseed oil, mixed with the yolks of two eggs, with half a pint of broth or gruel, is to be given.—Should this fail to produce purging, give an injection of two ounces of spirits of turpentine, and four quarts of thin gruel. When this is effected, give three ounces of laudanum in half a pint of gruel by the mouth. It is to be recollected that the use of opium is to be restricted altogether to the advanced period of the disease, when the general and local inflammatory excitement has been in some degree broken down by bleeding, for at an earlier period it could hardly fail proving injurious.

DIARRHŒA OR LOOSENESS.

This disease may be known by the frequent liquid stools, which is generally owing to inflammation or irritation of the mucous membrane of the intestines.

Cause.—It is commonly caused by the use of food noxious by its quality or quantity.

Treatment.—If the disease continue a long time, with smart gripings, and the horse lose his appetite, give him a pint of linseed oil with eighty drops of laudanum—if this does not check the disease, repeat the dose and increase the laudanum.

FATTY DIARRHŒA, OR MOLTON GREASE.

By Molton Grease, is meant a fat or oily discharge with the dung.

Symptoms.—It is generally attended with a fever heat, restlessness, starting and tremblings, great inward sickness, shortness of breath. His dung will be extremely greasy, and he will fall into a scouring.—His blood will have a thick skin of fat over it when cold, of a white or yellow hue, but chiefly the latter; the congealed part or sediment is commonly a mixture of size and grease, which makes it so extremely slippery that it will not adhere to the fingers, and the small portion of serum feels also slippery and clammy. The horse soon loses his flesh and fat; and those that survive this shock commonly grow hide-bound, the legs swelling, both before and behind, and continue in this state till the blood and juices are rectified; and if this is not done effectually, the farcy, or some obstinate surfeit, generally follows.

Cause.—This disease is said to arise from a colliquation, or melting down of the fat of the horse's body, by violent exercise in very hot weather, and absorbed into the blood.

Treatment.—In the first place, bleed the horse, and repeat the bleeding for two or three days, successively, in smaller quantities, and have cooling emollient injections daily thrown up, and give by the mouth the following combination:—

Pulv'd Nitra, 1½ oz.—Ipecacuanha and Calomel, of each 2½ drachms.

Molasses or syrup a sufficient quantity to form a ball.—Divide into six equal parts, and one of these to be taken every three hours until the fever abates.—When the fever has quite gone off, and the horse has recovered his appetite, gentle alectic purges should be given once a week, for a month or six weeks. In order to bring down the swelled legs, take

Aloes, 6 drs.—Pulv'd Gum Guaiacum ½ oz.—Tartar Emetic and Gum Myrrh, each, 2 drs.

Make into a ball with syrup.

CONSTIPATION, OR DRY GRIPES.

This is a species of cholic, and arises from costiveness. It is discovered by the horse's frequent and fruitless motion to dung; the blackness and hardness of the dung; the frequent and quick motion of his tail; the high color of his urine, and his great restlessness and uneasiness.

Treatment.—In this case, the straight gut should be untied by a hand dipped in oil, and an oily opening injection, and a purge, should be given as soon as possible.

FLATULENT CHOLIC.

Symptoms. The horse often lies down, and as suddenly rising again with a spring; he strikes his belly with his hinder feet, stamps with his fore feet, and refuses his feed.—When the disease is violent, he will have convulsive twitches; his eyes turned up, and his limbs stretched out, as if dying; his ears and feet being alternately very hot and cold; he falls into profuse sweats, and then into cold damps; strives often to stale, and turns his head often to his flanks; he then falls down, rolls about, and often turns on his back;—this last symptom proceeds from a stoppage of urine, which almost always attends this sort of cholic, and which may increase by a load of dung pressing on the neck of the bladder.

Cause.—Drinking cold water when the perspirable matter is retained, or thrown on the bowels, by catching cold or cribbing.

Treatment.—An ounce of oil of juniper, or two ounces of spirits of turpentine, will generally give relief in slight cases. Soot tea is said to be efficacious in allaying the cholic and promoting the expulsion of wind from the bowels.—But the most prompt medicine is opium, in large doses,—from two to four ozs. of Laudanum, mixed with an equal quantity of spirits of turpentine, or peppermint, or allspice water, (it imports little which,) and the mixture diluted with double its quantity of, viz., a pint of water.—As soon as the drink has been administered, the horse's belly should be well rubbed, after which he should be well raked, and a copious injection of soap and warm water thrown up—or, take

Epsom Salts, 6 ozs.—Castile Soap, sliced, 2 ozs.

Dissolve them in 1½ pints of warm gruel, then add

Laudanum, ½ oz.—Oil of Juniper, 2 drachms.

Mix and give when about blood heat. This drink may be repeated every four or five hours till the symptoms abate.—Or, give the following, which is said to be a most certain cure in two hours:

Spirits of Nitre, 2 ozs.—Laudanum, 1 oz.—Sweet Oil, 1 oz.

All to be given in a gill of warm ale. This is said to be one of the best preparations yet discovered.

Instantaneous relief is often afforded by passing up a hollow bougie through the fundament and passing it pretty far up.

At times the air, instead of being pent up in the intestines, escapes through a perforation in the intestines into the cavity of the belly.—In such cases, make an opening into the cavity at the most protruded part.

BILIOUS CHOLIC.

This species of cholic is attended with most of the symptoms of the preceding, together with a fever, great heat, panting, and dryness of the mouth. The horse also generally throws out a little loose dung, with a hot scalding water, which, when it appears blackish, or of a reddish color, and fœtid smell, denotes an approaching mortification.

Cause.—It is generally believed that the liver is morbidly active in this disease, and that a redundant secretion of bile is one of its most essential conditions.

Treatment.—When the pulse is vigorous and tense, and tenderness to pressure on the belly is great, bleed largely, in order to lessen the liability to inflammation, which, in full habits, is very considerable in this affection. If there appears irritability of the stomach, give physic, and when the bowels are freely opened, give him about two ounces of laudanum.

WORMS.

We shall notice three species of worms.

1. [Teres.] *Long Round White Worm.*—These worms inhabit the small intestines—at least they are but rarely found in the large and never, we believe, in the stomach.

2. [Ascaris.] or *Thread Worm.*—The thread worm is found occasionally in the large guts, in prodigious numbers, and above all within the blind pouch of the cœcum;—this is a very destructive species of worms.

3. BOTS.

The Bots are formed in the stomach and are simply the larvæ, or caterpillar, of the gad fly, bearing the same relation to the fly itself that the silk worm does to its moth.

The latter end of the summer is the time the fly deposits the eggs on the horse, and by the act of biting, or picking themselves, which horses are prompted to from the bite of the fly, it appears that the eggs are transported upon the tongue, and thence pass probably with the food into the stomach, where, from heat and moisture, they become hatched and give origin to a small active worm which grows by the ensuing summer to bots. About June, having completed its growth, it becomes expelled from the body with the dung in which it lies enveloped upon the ground, whilst it again changes its state by becoming a chrysalis or grub, and after it has lain a few weeks in the dung it changes into a fly.

Symptoms.—The symptoms of worms, and bots are, the animal stamping forcibly on the ground with either of his fore feet, and frequently striking at his belly with his hind ones. Belly projecting and hard, looking frequently behind him, and groaning as if in great pain, staring coat, hide bound, irregular appetite, and clammy mouth.

Treatment.—Keep the horse from all kinds of food for one day, at night give him a small quantity of warm bran mash, made as usual, and directly after give Pink root in daily doses of half an ounce, or a drachm of Tartar Emetic may be given in bran mashes, every night for a week, and after that a brisk purge, which will generally expel the Teres, or long round white worm.

Ascaris, or Thread Worm, may be got rid of by giving an ounce of Aloes every second day, together with injections of lime water and milk in equal proportions.—Daily injections of a solution of Aloes will generally bring off an abundance of these worms. An injection of two ounces of Spirits of Turpentine with one quart of milk will answer well.

Bots.—It is extremely difficult to destroy the larvæ in the stomach of a horse, under any circumstances, by the use of any remedy which would not be worse than the disease.—Blood-letting has a tendency to remove the inflammatory disposition, and should be the first resort, and should be frequently repeated, at the same time that mild oils are administered.—Drenches may sometimes be used.—A great variety of medicines have been proposed, such as Fish brine, Pepper, Linseed oil, Tincture of Tobacco, Pink-root, Indigo, Chamber-ley, Spirits of Turpentine, &c., but they sometimes fail to effect a cure. It is found by experimenting with a great many of the most celebrated medicines, that Spirits of Turpentine has the effect of killing the bot in a shorter space of time than any other; but I think you might almost expect as much relief from a gill of water, as the same quantity of turpentine given to a horse;—why, a man will take a gill for a dose. I would say, give at least half a pint, and in half an hour after give a pint of Castor oil, or the same quantity of Linseed oil; if this does not give relief repeat the turpentine.—Calomel, in large doses, is said to effect a cure—repeating it at proper intervals—also, Æthiop's mineral.—Or take of Bees-wax, mutton tallow and loaf sugar, each 8 ounces, put it into one quart of new milk, and warm it until all is melted—then put it into a bottle, and give it just before the wax, &c. begins to harden.—About two hours after, give physic. The effect is, that the bots are discharged in large numbers, each piece of wax having from one to six or eight of them sticking to it, some by the head, but mostly by their legs or hooks.

It is said that opium given in large doses is efficacious; it stupifies them; then give physic to carry them off; or the following, which is said to be infallible: Sage tea is pronounced a sure remedy, if used before the stomach of the horse is eaten through and ruined. Give one quart of warm sage tea, well sweetened; half an hour after, give another quart; half an hour after, give one gill of tar; and half an hour after, give a purgative. The sage being an astringent, will cause the bots to let go their hold of the stomach, and the tar kills them. If the horse should have the cholic instead of the bots, still the sage will be good for that. The sage has been tried on living bots taken from the maw of a horse, and it killed them instantly. Turpentine they can endure. They will even live in aquafortis for a while, but the sage is immediately fatal.

The following has never been known to fail. To make the bots let go their hold, give the horse a quart of molasses, or dissolved sugar, with a quart of sweet milk. In thirty minutes you will find him at ease. Then pulverize an eighth of a pound of alum, dissolve it in a quart of water, and give as a drench. In two hours, or less, administer one pound of salts, and you will effect a cure. Or the following—Half pint vinegar, half pint soft soap, half pint gin, and half pint molasses, well shaken together, and poured down while foaming.—This has been recommended and given, in perhaps fifty cases, with the same good effect; not in one instance has it failed to effect a perfect cure.

ROARING.

Roaring consists in partial obstruction of some one of the air passages, in consequence of which a peculiar sound or noise is created every time the air passes into or out of the lungs, with more than ordinary force or celerity. The noise is more commonly elicited by the act of inspiration than expiration, occasionally by both. The nature and intensity of this unpleasant sound will depend upon the particular situation, extent, locality and relative volume of the obstruction, and therefore it is that we are in some slight measure enabled to give an opinion about the disease when we examine the horse, according as we find him to be a *Wheezer* or *Whistler*, *High Blower*, or *Grunter*, all which jargon is in common use among horse dealers, and has been from them adopted by professional men to denote certain kinds or stages of *Roaring*, for which they have as yet no other terms.

The *Wheezer's* noise has been well compared to the sound made by an asthmatic man; it has a deep wheezing sound, and proceeds, we believe, from obstructions in some of the branches of the windpipe.

The *Whistler's* note resembles the northern blast rushing through a crack in the window-shutter. It is occasioned by some diminution or contraction of the passage either in the windpipe itself or the larynx.

A *High Blower* is recognized by puffs or small blasts proceeding from the nostrils.—In this case the impediment is in the head.

The *Grunter* emits murmurs or deep buried sounds, resembling the grunts of a hog.—This noise, we are of opinion, proceeds from the ramifications of the windpipe.

The *Genuine Roarer*, or, as he is sometimes designated in contradistinction to the other species, the *confirmed roarer*, is the one whose boations in inspiration are too loud and too notorious to need description. Very many roarers are harness horses, and become so disordered from the continued reining in of the head by the bearing rein. These cases, if recent, are the most favorable we can encounter. The plan of proceeding with them consists in so confining the head that the very opposite tendency be given, viz, reining it as much outward as possible, and at the same time elevating the nose; by thus posturing the animal for four or five hours every day, and working his mouth so as to produce the same effect at exercise, much benefit, and even a cure, may result. In other cases repeated blisters along the course of the windpipe, or several setons passed transversely through the skin in front of it, aided by the absorbent effect of purgative and diuretic medicines, are the only measures likely to be productive of much amelioration.

BROKEN WIND.

A broken wind is much sooner detected than the roarer, it being a disorder of much more general concern, and one that the animal manifests at all times, in a state of rest as well as action;—in fact there is no dealer nor groom who is not acquainted with its signs, and the injurious consequences resulting from it.

Symptoms.—Two evidences especially guide us in discovering it,—a peculiar disordered breathing, and the kind of cough which accompanies it. Expiration becomes comparatively long, protracted and difficult,—inspiration altogether as short, sudden and free.—This is shown by the flanks very gradually and slowly contracting, until they have drawn themselves up to their utmost, and then all on a sudden expanding and resuming their original fullness. The cough, which is only occasional, and most so under exertion, is so peculiar in its sound, that once heard, it can hardly ever be mistaken. It is short and feeble, scarcely audible at any distance; it appears as if it came from the very summit of the windpipe, or as if it had been chopped off in its passage.

Treatment.—This is one of the irremediable diseases, but may be relieved in a measure by a careful attention to diet.—The food should be compact and nutricious—corn is better than oats, and old hay, which has been well kept, better than new. During the grass season it often almost disappears but recurs in winter, during which, potatoes may be given to advantage—also, carrots, parsnips, and beet-roots; molasses in small quantities has been recommended; also, tar-water. In case the cough be troublesome, bleeding will be found highly advantageous.

Of all the remedies we possess, however, the *Lobelia Inflata* is, I think, decidedly the most valuable in this affection; it may be given in doses of three ounces of the tincture every half hour, until he breathes free; or give the seeds, or pods, in doses of two drachms, made into a ball, every hour.

STRANGLES.

This disease is familiarly known by the name of *Distemper*, and is one to which colts and young horses are very subject; but at seven years old are out of danger.

Symptoms.—The horse will have great heat and feverishness with a painful cough. Some horses lose their appetite entirely; others eating but little, owing to the pain which chewing and swallowing occasions. When the swelling begins on the inside of the jaw-bone it is much longer in coming to a matter than when more to the middle,—when it arises among the glands and divides into several tumors, the cure is generally tedious, as it breaks in different places, and when it forms upwards on the windpipe and gullet, there is sometimes danger of suffocation, unless the swelling soon break; there is also a dangerous kind of distemper in which the horse runs at the nose; this by some is called the *bastard strangles*.—There are also the *blind strangles*, in which the horse will go blind, or nearly so.

Treatment.—When the strangles first appear and the tumor is hard, seldom any thing is required to be done, unless we are desirous to repel it, and then we may employ a mild blister, and at the same time bleed and purge the horse. The common opinion, however, is, that this is not so beneficial a practice, as that which promotes suppuration, and therefore we may either leave it to itself or foment the swelling twice or thrice a day with hot water;—the pointing process is to be closely watched, and to be considered the signal for opening the abcess. The matter being all pressed out, spirits of turpentine is to be injected into the cavity once a day—scrupulous attention being paid in the course of cure to keep the abcess open. If the fever and inflammation run high, and there be danger of suffocation, a moderate quantity of blood may be taken. If the running at the nose continue, give him every day an once of Peruvian bark, or a strong decoction of Guiacum shavings. If a hardness remains after the sores are healed up, anoint with mercurial ointment.

CATARRH, OR COLD.

A cold consists of an inflammation more or less extended, and more or less violent, of the membrane lining the nostrils, and hence reaching into and coating the inside of the windpipe and its branches.

Symptoms.—A mucous, or mucopurulent discharge comes from the nostrils, the matter being white or yellow according as it partakes more or less of mucus, the membrane lining of the nose is seen to be very red and inflamed, when the nostrils are opened; sometimes there is swellings under the throat, or just beneath the roots of the ears, and there commonly is present a cough, to which may be added that, should the cold prove severe, the animal grows dull and feverish.

Cause.—It is now ascertained that a cold is caught by going from a cold to a warm situation, and not from exposure to cold, therefore it is that young unbroken horses are the common subjects of it, and in particular at that period when they come to be removed from pasture for domestication. A cold is an obstructed perspiration.

Treatment.—A cold itself requires very simple treatment; it is only to be regarded as offensive inasmuch as it may prove the precursor, or lay the foundation of some other disease of injurious tendency, such as roaring or inflammation of the lungs, or even glanders.—On this account it ought seldom, in its mildest form, to be allowed to take its own couise.—In common cases if we give the animal daily a ball composed of one drachm of aloes, two drachms of tartar emetic, the same of ginger, with a sufficiency of syrup to form a ball, and give him a bran mash every night with half an ounce of nitre mixed in it, and repeat this in the morning, about a week will perfectly reinstate him. If there is much fever the animal should loose from two to four quarts of blood.

PLEURISY AND INFLAMMATION OF THE LUNGS.

As the symptoms of these two diseases are nearly similar, as well as the treatment, we have thought it as well to treat them together.

Symptoms.—A short, quick and painful respiration, manifested by the heaving of the flanks and the working and puffing of the nostrils; the pulse also runs high, but very frequently is not so quick as the breathing—the animal's countenance betrays inward pain; he casts an impressive look around to his panting flank; his legs and ears are icy cold; his mouth is dry and parched; he never is found lying down, not even at night, but stands with his fore legs stretched out, and apart, one from the other.—Should the pulse and breathing run immoderately high, the mouth feel cold and clammy, and a cold sweat appear over the body, we may prepare ourselves for a fatal issue.

Cause.—The various changes which the horse is subject to, appear more or less to conduce to it, but none in so great a degree probably as the change from a situation abounding with cold and pure air, to one whose atmosphere is confined, heated, and loaded with impurities.

Treatment.—The treatment of this disease consists principally in the judicious use of the lancet.—In general the first blood letting should be such as to have a perceptible effect on the pulse; it is impossible to say precisely what quantity it may be requisite to draw to effect this—that will so much depend upon the size, age, condition, and constitution of the horse. Having bled the animal, clothe him very warmly—flannel bandage his legs, and administer to him half a drachm of the powdered root of white hellebore, the like quantity of aloes, two drachms of tartar emetic, and half an ounce of aromatic confection. In six or eight hours, should the symptoms continue unabated, bleed him again; at all events give him another ball, which is to be repeated, (provided he shows no disposition to nausea or purging,) every six hours.—As soon as an impression on the violence of the symptoms has been made by bleeding, blister both sides, and insert a seton in the chest. During convalescence it is proper to administer, every other day, a ball composed of nitre and soft soap, to prevent any accumulation of water within the chest, which is the most fatal termination of the disease.

ASTHMA.

Symptoms.—The horse affected with this disease eats heartily, and goes through his business with alacrity, appears well coated, and has all the signs of health; yet he coughs at particular times almost incessantly, without throwing up any thing except that the violence of the cough will cause a little clear water to distil from his nose. Though this cough is not periodical, yet some of these horses cough most in the morning after drinking. This may properly be called a nervous asthma.

Treatment.—If the cough be violent and frequent, it will be necessary to bleed, after which the tincture of Lobelia Inflata may be given in doses of a gill diluted with some liquid, every two hours until the paroxysm is abated.

CONSUMPTION.

Symptoms.—The horse's eyes look dull, the ears and feet are mostly hot, he coughs sharply by fits, sneezes much, and frequently groans with it; his flanks have a quick motion, he gleets often at the nose, and sometimes throws out a yellowish curdled matter, and he has but little appetite for hay, but will eat corn, after which he generally grows hot.

Cause.—This disease often proceeds from neglected cold.—Standing in damp stables may cause it.

Treatment.—When the disease is once firmly seated in the lungs, all that can be done is to smooth the passage to the grave. As to a cure, the principal thing is bleeding in small quantities (a pint or a pint and a half from some horses is sufficient,) which should be repeated as often as the breath is more than ordinarily oppressed. Blistering is often beneficial; or setons may do good. If the horse be afflicted with this disease in the spring, turn him out to grass in the day time, and give the following:

Tar, 1 lb.—Garlic, 4 ozs.

Bruise the garlic, and work them up with liquorice powder into a paste, and give two ounces at a time every day.

ANTICOR.

This disease may be known by a malignant swelling in the breast, which extends sometimes to the very sheath under the belly; it is attended with a fever, great depression and weakness, and a total loss of appetite; but this last symptom may probably be owing to an inflammation, which is supposed to affect the whole gullet and throat, so great as to make the horse swallow with the utmost difficulty, and to be in danger of suffocation.

Treatment.—If there should be inflammation, bleed—emollient injections should be given twice or thrice a day, with an ounce of nitre dissolved in each, and the following drink should be given.

Cream of Tartar, 4 ozs.—Glauber or Epsom Salts, 2 ozs.

Dissolved in some liquid. A ripening poultice with onions boiled in it, should be daily applied. If by this method, continued four or five days, the inflammation in the throat and gullet is removed, our attention should more particularly turn to encourage the swelling at the breast, and bring it if possible to matter, to which end, continue the poultice, and give two ounces of Venice turpentine, dissolved in a pint of beer, every night; when the swelling is grown soft, it must be opened and dressed with the turpentine digestive.

JAUNDICE, OR YELLOWS.

Symptoms.—The eyes, the inside of the mouth and lips, the tongue, and bars of the roof of the mouth, look yellow; the horse is dull, and refuses all manner of food; the fever is slow, yet both that and the yellows increases together; the dung is often hard and dry, of a pale yellow, or light pale green; his urine is commonly of a dark, dirty brown color, and when it has settled some time, it looks red like blood; he stales with some pain and difficulty; and, if the disease is not checked, soon grows delirious and frantic; the off side of the belly is sometimes hard and distended.

Cause.—The Jaundice is caused by an obstruction of the flow of the bile.

Treatment.—If there be fever, bleed and physic him, if this does not relieve him give him the following powders every other day in some warm liquid.

Salt of Tartar, 2 ozs.—Æthiop's Mineral 1 oz.—Turmeric (Blood root) 3 ozs.

INFLAMMATION OF THE KIDNEYS.

Symptoms.—The horse stands wide and stiffly with his hind legs, and he straddles in his walk; he either can make no water at all, or he voids very little every now and then, and that little is perhaps bloody, or turbid and thick, as if it were mixed with matter.

Cause.—This disease is caused by the injurious use of diuretic medicine, or else by feeding on mow-burnt hay, or foxy oats, which have the same effect.

Treatment.—Blood letting constitutes the primary remedy in this disease, after which give half an ounce of calmoel mixed with syrup to form a ball, and follow, in the course of three or four hours, with a pint of castor oil.—The loins should be fomented with water as hot as it is possible to use, and the fomentation succeeded by a mustard embrocation—also give emollient injections. When the inflammation is reduced, rub him well over the kidneys with Croton oil, or Opodeldoc.

INFLAMMATION OF THE BLADDER.

Symptoms.—The animal will paw, lie down and rise again and otherwise express much uneasiness, but he will not manifest that rigidity and tenderness about the loins which is indicative of diseased kidneys.

Treatment.—In addition to the remedies recommended for inflammation of the kidneys (which are equally applicable to the case before us.)—If, after the bleeding, purging, and fomentations, no urine be voided, we are to pass a catheter into the bladder.

DIABETES.

This may be known by frequent discharges of large quantities of urine, skin dry, bowels costive, appetite voracious, weakness, and gradual emaciation of the whole body.—This disorder is seldom cured in old horses, but may be effected in young ones.

Treatment.—The carbonate of ammonia, in doses of two drachms three times a day, is strongly recommended upon high authority. In addition to this, opium in doses of one drachm, and exercise. The bowels should be kept open, or you may give the following:

Peruvian Bark, 2½ drachms.—Uva Ursi, 2½ drachms.—Opium, 6 grains.

Syrup a sufficient quantity to make a ball, to be given three times a day with lime water. Instead of giving him common water to drink, give him lime water, to make which, take about three pounds of lime, unslaked, put it into a clean vessel, and for every pound of lime pour six quarts of water into it—let it stand three days, take the same off the top, and give the water to the horse to drink; give him no moist feed.

SUPPRESSION OF URINE.

Symptoms.—Violent and frequent attempts to make water, attended with excruciating pain.

Treatment.—Bleed and apply warm water to the kidneys, give a laxative and anodyne injection as soon as you can, and repeat it frequently; half an ounce of laudanum may be given.

MANGE, OR SURFEIT.

Mange is a well known disorder of the skin among horses, occasioning them to rub the parts affected against any thing they happen to be standing near. It has been likened to the itch, and not without reason, the two appearing to be extremely analogous.

Symptoms.—The disorder begins with simply an itchy and scurfy state of the skin, commonly about the head, side of the neck, withers and shoulders; sometimes the armpits and thighs, which parts soon afterwards exhibit bare white patches, in consequence of the outer skin (becoming dry and turning white) continually desquamating in branny scales. The next change consists in the parts becoming arid and harsh to the feel, and in their puckering into wrinkles.

From the notorious fact of Mange being a contagious disease, any one would suppose that it was always produced by that influence; there appears, however, great reason to believe that it arises in many cases spontaneously, and still more to show that poverty is one grand cause of its origin.

Treatment.—Take of sulphur six ounces, train oil one pint, stir them together and add two ounces of Venice turpentine. Or this: take of sulphur four ounces, powdered hellebore two ounces, corrosive sublimate one drachm, first mix these powdered ingredients together, and afterwards stir them into a pint of train oil. With either of these applications, the parts affected are to be well rubbed. On the third day following, wash them, and afterwards repeat the dressing the same as before, and continue this plan until the cure is completed. Sometimes the disease settles in the legs, and causes them to swell.—When this is the case, two taps, put into the lower belly, will be found of great use.—Staling balls should be given every third day, and plenty of warm water to work them off with. Make the staling balls as follows:

White Rosin, 1 oz.
Oil of Juniper, 2 drs.
Salt Petre, 4 drs.
Castile Soap, 4 drs.
Camphor, 2 drs.

Make them into a paste, and form into balls. The above is only for one dose, but you may make as many as you think proper at once, and keep them for use. When the disease has taken a firm hold, it will require sharper treatment.—Take the following for one horse:

Flour of Sulphur, 4 ozs.
White Hellebore Root, pulv'd, 2 ozs.
Blue Stone, pulv'd, ½ oz.
Verdigris, pulv'd, ½ oz.
Flanders Oil of Bays, 4 ozs.
Whale Oil, 3 gills.

Mix all well together and rub the horse well with it all over; in the sun, if in summer, but with a warm iron if in winter. This is said to be a certain cure. At the same time give freely of flour of sulphur and liver of antimony.

SCRATCHES.

Symptoms.—The heels are swelled, and full of cracks in the fetlock joint, which, at times, will cause them to go lame.—The Scratches have some affinity to the Grease, and are very often nearly the same complaint.

Treatment.—Wash the legs with warm strong soap suds, and then with beef brine. Two applications will cure the worst case.

MALLENDERS AND SALLENDERS.

Mallenders are cracks in the bend of the knee, that discharge a sharp, indigested matter; they are often the occasion of lameness, stiffness, and the horse's stumbling. Sallenders are the same distemper, situate on the bending of the hock, and occasion a lameness behind.

Treatment.—They are both cured by washing with a lather of soap, warmed; or old chamber ley, and then applying over the scratches a strong mercurial ointment, spread on tow, with which they should be dressed night and morning till all the scabs fall off; if this should not succeed, anoint them night and morning with a little of the following, and apply the above ointment over it. Take hog's lard two ounces, corrosive sublimate two drachms, Æthiop's mineral half an ounce, white vitriol one drachm, soft soap six ounces; mix, clip away the hair and then anoint with this often.

CROWN SCAB.

The Crown Scab is a humor that breaks out round the coronet, which is very sharp and itchy, and attended with a scurfiness.

Treatment.—Sharp waters prepared with vitriol, are generally used for the cure, but the safest way is to apply yellow basilicon ointment round the coronet. A dose or two of physic may be proper.

GREASE.

This disease consists in an undue issue of a peculiar greasy, offensive matter from the hollow part denominated the heel of the foot. There is in the state of health a continued oozing from this part, of a secretion of a ceruminous nature, which serves to lubricate it, and facilitates flexion and extension (the same as is the case in the armpit of a man,) and it is in consequence either of the filthy condition of the part, or an attack of inflammation in it, that this secretion becomes altered in quality or quantity, or both, in which consists Grease.

Symptoms.—The disease may be confined to the hollow of the heel, or it may extend up the back of the leg even as high as the hock. In the first stages, it consists simply in altered action of the secreting parts, in an issue unnatural in quantity and quality; but gradually, in the advanced stages, the skin itself, from which the discharge comes, undergoes a change—its surface becomes pimply, and exceedingly tender to the touch, and ultimately little irregular pustulous eminences arise from it, to which, on account of their form, farriers have given the appellation of Grapes.—In the first instance, but little soreness is manifested, but, as the disease spreads, and particularly whenever the leg becomes much swollen, the pain, on motion, appears to be intense for the horse will catch the diseased limb, and hobble along on the three others, rather than bear the smallest weight upon it.

Cause.—The most common cause of all others, of this disorder, is the practice of washing or wetting the heels, and allowing them to get dry spontaneously; this, in cold weather in particular, by the evaporation it creates leaves the heels in a state of coldness, in which condition they are, like all other and even more than most other parts, susceptible of inflammation, which is almost certain to come on with the return of heat or warmth to them. The inflammation gives rise to the augmented issue, its continuance alters its nature, the matter collects and increases about the heels, rapidly grows putrid, and thus becomes the source of a stinking, loathsome effluvia.

Treatment.—The treatment will be simple, or more or less complicated, according to the duration, stage, and virulence of the disorder. A case consisting simply in augmented issue will require only some mild astringent applications, such as equal parts of the powder of alum and bole Armenian; or of those of charcoal and calamine; or should an ointment be preferred (and it is what we are in the practice of using) two drachms of finely powdered alum, is to be rubbed into an ounce of hog's lard, or what the druggist sells as mild citrine ointment.—Should the legs fill, a diuretic, or purging powder should be given at the same time, to wit, yellow resin 4 ounces, nitre 8 ounces, cream of tartar 4 ounces.—Dose, 6, 8, or 10 drachms every night. The animal should be walked out twice a day. Whenever the heels, however, are hot, swollen and tender, instead of this, emolient poultices must be employed and continued until such time as the inflammation is mitigated, after which estringents may be used. When there is much fœtid discharge, a charcoal poultice will be found to be the best corrective. In neglected cases, as soon as the inflammation is diminished, in the limb by local bleeding, purging, and poulticing, we must apply this linament to the heel, after the manner of a poultice, to wit, 2 drachms powdered blue vitriol, ½ an ounce of alum, in powder, and 1 ounce of Armenian bole, mixed together and stirred in 3 ounces of common oil. It should be allowed to remain applied three days, after which the horse should be exercised well, to take the swelling away, and then fresh dressing is to be applied. In this way a certain cure will be effected, in all cases excepting those having Grapes, and they must be cut off with a sharp knife, and afterwards cauterized, after which the same liniment, with twice the quantity of vitrol, should be applied over all the diseased surface.

CANKER.

Canker is an extremely loathsome disease, which very often has its origin in frush, or thrush—at other times it is produced by grease; in fact it may originate in almost any neglected or maltreated diseased action, continuing long in the foot.

Cause.—It is brought on by the ichorous and putrid issue of the diseased part, corrupting the adjoining healthy parts, and at length inducing in them a malignant cancerous action, which, when once set up, spreads rapidly over the contiguous surface.

In place of producing hoof, parts once become cancerous or cankerous, give growth to a white, soft, fungus substance, which on being cut or pricked, readily bleeds, and would appear also, from the irritability of the animal, to be highly sensitive.

Treatment.—The first object should be to destroy this morbid secretory action, which is best done by aquafortis, with a feather dipped into the liquid; spread it over the surface, after which cover the parts with an ointment composed of

Verdigris, in powder, 5 oz.—Vinegar, 8 oz.—Molasses, 12 oz.

mixed all together and boiled over a slow fire, to the consistence of honey.

FARCY, OR FARCIN.

Farcy is a well known disease, consisting in chains of lumps or ulcerations of the skin, with or without swellings of the limbs or other parts in which they are seated.—It is remarked that farcy mostly breaks out in those parts where the skin is thinnest, which accounts for its commonly attacking the inside of the thigh, but the pathological or true explanation of this is, that along those parts take their course the absorbent vessels, in which (and not in the veins) the disease is seated.

Symptoms.—The ordinary appearances of farcy are cords of lumpy or knotty swellings under the skin, taking the course of the superficial veins, which cords are traceable into large kernels or glandular tumors either in the groin or breast, or else under the jaw, according as the disease affects the hind or fore leg, or the side of the head. The knots (which by the farriers are denominated farcy buds) are at first hard to the feel, and give little or no sensibility on pressure, so that the animal suffers you to handle and squeeze them, but by degrees they acquire tenderness, inflame, feel hotter than the skin surrounding them, and at length begin to grow soft, at which period they also swell in bulk, and eventually burst, and give issue to a prurulent matter. The lumps, after they have burst, leave behind them a chain of small, circular, nasty, foul sores. Should the hind or fore leg be farcial, the entire limb becomes swollen, hot and tender, according to the progress the disease makes; the head or neck, or any other part similarly affected, will likewise become tumefied. In some cases the farcied parts become dropsical, the skin, which is often prodigiously puffed up, acquires a soft, doughy feel, which anomaly of common or ordinary farcy, the farriers have named water farcy.

Treatment.—If the attack be a violent one it should be met by bleeding and purging, after which it is most successfully treated by tonics.—Having well cleared out the body, administer every day from half an ounce to an ounce of green vitriol (or, as it is commonly called, copperas,) and ten grains of corrosive sublimate, made into a ball with half an ounce of Venice turpentine; exercise, good air, and nutritious diet, will be found to be useful auxiliaries.—In regard to the local treatment, should the corded parts be hard and insensible to the feel, blister them, and that will probably disperse them, if not, it will promote the suppurative action.—As soon as the knots have burst apply a heated budding iron to them, (which is an iron made with a blunt conical point) so as to destroy the diseased surfaces, and dispose them to take on healthy action. Afterwards, in the progress of their healing, they may be dressed with a solution of blue vitriol or else an alum lotion. Sometimes the disease will not yield to this treatment, especially when situated near the flanks at the lower belly. In this case use the following

Corrosive Sublimate, 1 drachm.—Spirits of Salt, 1 ounce.

Powder the sublimate, and put into a bottle, and put the spirits of salt upon it to dissolve it; then add 2 ounces of vinegar, by degrees. This is very good to dress the ulcers with;—the following composition is stronger than the last, and on that account is often used.

Take Spirits of Wine, 4 oz. Oil of Vitriol, 4 oz.
Oil of Turpentine, 2 oz. Good Vinegar, 2 oz.

Mix all well together, and apply to the ulcers.

The following is recommended by an eminent practitioner. Take

Linseed oil, ½ pint. Barbadoes Tar 2 ozs. Oil of Origanum ½ oz. Oil of Bays, 2 ozs.
Oil of Turpentine, 3 ozs. Strong Aquafortis, ½ oz. Tincture of Euphorbia, 2 drs.

Mix and apply once in two or three days.—The watery swelling under the belly may be scarified; that is, make holes through the skin. This may be done by a short fleam. Strike a good many holes at a time, but be careful to avoid the veins. By this means a good deal of water will run out. Give physic; and give lime water with a little nitre in it, and let the horse's food be warm mashes of bran, with a little malt in it. Or you may give the following urine ball.

Squills, 2 oz. Castile Soap, 1 oz. Yellow Rosin 4 oz.
Camphor, 1 oz. Turpentine, ½ oz.

Make these into a ball with honey, and give one ounce at a time. These balls will work the water off by urine.

THRUSH, OR FRUSH.

This is so common a disease, and one that is so commonly unattended with any sort of suffering, or at least sufficient to occasion lameness, that many people look upon a thrush as no disease at all.

Symptoms.—This disease consists in a fœtid issue from the cleft of the frog, which gradually rots away the horn in the immediate vicinity, until the whole of the cleft, whose cavity becomes at the same time enlarged, acquires the softness of cheese, and turns into a mass of corruption of the most malignant and noisome description.

Treatment.—In recent cases, simple astringents are all that is required.—Equal parts of powdered alum and charcoal; or, of the former and double its quantity of Armenian bole; pare out the cleft, and introduce some of the powder upon a piece of tow, and renew the dressing every day. In worse cases a small proportion of powdered blue vitriol must be added, about one part in six. Vitriol water (made by mixing one ounce of vitriol with a pint of water) is also a very good application. After the dressing is applied, in wet weather it is a good practice to pour melted tar over the surface of the frog, to prevent the dirt and wet from penetrating into the cleft.

CONVULSIONS, OR STAG EVIL.

Symptoms.—As soon as the horse is seized, his head is raised with his nose towards the rack, his ears pricked up, and his tail cocked, looking like a spirited horse when he is put upon his mettle, his neck grows stiff, and almost immoveable; and in a few days several knots will arise on the tendinous parts thereof; if trial be made to walk, he is ready to fall at every step; he snorts and sneezes often, pants continually with shortness of breath.

Treatment.—In all cases the horse should be bled plentifully, unless he is low in flesh, then you must be more sparing, after which give the following ball:—Take assafœtida half an ounce, Russian castor, powdered, two drachms, Valerian root, powered, one ounce, honey, a sufficient quantity to form a ball.—This ball may be given twice a day at first, and then once.—The body should be kept open by laxative purges, and emolient injections.

EPILEPSY, OR SLEEPY EVIL.

This is a disease in which the horse falls to the ground in a convulsion, the eyes are distorted, and turned up, foaming at the mouth, and the whole ending in a deep sleep.

Treatment.—A peice of wood should be placed in his mouth to prevent his tongue from being bitten; this is all that can be done during the fit.—If, however, there are symptoms of great determination of blood to the head, bleeding should not be neglected.—Steady and long continued purging is said to be useful. Large doses of spirits of turpentine are said to have afforded relief.

APOPLEXY, OR STAGGERS.

Symptoms.—Drowsiness, watery eyes, somewhat full and inflamed, a disposition to reel, feebleness, a bad appetite, the head almost always hanging or resting on the manger, sometimes with little or no fever, and scarcely any alteration in the dung or urine; the horse is sometimes disposed to rear up, and apt to fall back when handled about the head.—If the disease proceeds from wounds or blows on the head, or matter on the brain, besides the above symptoms the horse will be frantic by fits, especially after his feeds, so as to start and fly at every thing.

Treatment.—Bleed as speedily as possible; raise his head and shoulders with straw, after which give a pint and a half of castor oil, and apply a blister to the head.—It is often extremely difficult to administer cathartics by the mouth from the paralysed state of the organs of deglutition, and in such case give an injection of one ounce of aloes dissolved in water.

TETANUS, OR LOCKED JAW.

Symptoms.—The animal commonly first shows some rigidity about the neck, in turning his head to one side, which, in the course of a day or two, so much increases that he cannot turn his head at all without carrying his body round too.—The refusal of his food leads to an examination of the jaws, and they also are found rigid;—every time any thing frightens or annoys him, he throws up his head.—The limbs, if not already attacked, likewise grow stiff, either rendering progression awkward and unnatural, or almost impeding it altogether;—the tail is elevated and tremulous, the ears erect, the nostrils expanded, and the countenance displays a degree of anxiety; in short, the poor, suffering animal exhibits altogether a truly impressive and pitiable aspect.

Cause.—Tetanus may arise of its own accord, or at least without any apparent cause, or it may be, and most commonly is, the consequence of some local injury.

Treatment.—In the first instance, bleed largely, and repeat often, say every three hours, and every three hours give one drachm of opium; a blister may be applied to the head, and give an injection of half an ounce of tobacco in half a gallon of water slightly warmed, which should be repeated often;—after he is relieved of the spasms you may give a pint of linseed oil.

HYDROPHOBIA.

There is no disease in the whole catalogue, which we attack more hopelessly than this. Whenever the part can be freely cut out, this must be done.—No matter how late may be the period after the infliction of the wound, provided the symptoms of Hydrophobia have not appeared, this course has been recommended; when this cannot be easily performed, the red hot iron, heated to whiteness, should be applied so as to disorganize the whole wounded surface; or the part may be destroyed by lunar caustic. Innumerable remedies have, at different times, been lauded as infallible preventives of this affection, but sad experience has hitherto nullified all these pretended specifics.

The most celebrated of these remedies is Deadly Nightshade; in 176 instances this has prevented the disease. Dose for a horse is one drachm. A German writer says he never knew the internal use of Cantharides to fail in preventing the disease. He gives twelve grains of the powdered Cantharides daily, in union with Tartar Emetic, for five or six days in succession, and keeps the wound open for six weeks, by blistering. Bleeding very copiously is said to have effectually arrested the disease.

INFLAMMATION OF THE EYES.

The eye may become inflamed from injury of any kind, such as a blow with a whip, or stick, or the accidental admission into it of hay seed, dust, or dirt, &c. The immediate effect of any one of such like irritating substances, is a flow of tears, the simultaneous ejection of the haw over the eye, together with partial or entire closure of the eyelid, and this state continues so long as the irritant remains.

Treatment.—If hay seeds, dirt, or any other substance be in the eye, it should be extracted. The inflammation which follows, (should there be any) must be met by bleeding, either from the eye vein, or from the jugular of the same side, by a dose of physic, an infusion of poppies, or simply warm water and milk may be used as a wash.

SPECIFIC INFLAMMATION OF THE EYES, OR MOON BLINDNESS.

This is what farriers, phrase the "moon blindness." It would appear that this disease made its attack during the night, for it commonly happens that the groom discovers the bad eye the first thing in the morning.

Symptoms.—The eye has either a heavy, gloomy aspect, and seems smaller than the other, from the circumstance of the drooping of the upper lid, or it is quite shut up, the haw projects, and the tears wet, in their overflow, the under lid. On looking into the eye it is found to be so dull and muddy, that we can hardly discriminate any thing; its hue is evidently changed, being of another shade, and lacking lustre when compared with the eye in health.

Cause.—This disorder is one of the injurious consequences of warm and foul stabling.—It is periodical in its course, leaving the eye for a month or more, and then returning, or else attacking the other one, which has been until then in health. There is another kind of moon blindness, which is the forerunner of cataracts, where no humor or weeping attends.—The eye is never shut up or closed, but will now and then look thick and troubled, at which time the horse sees nothing distinctly.—When the eyes appear sunk and perishing, the cataracts are longer coming to maturity, and it is not unusual in this case for one eye to escape.

Treatment.—The treatment of this disease consists in drawing a large quantity of blood from the side of the neck corresponding to the affected eye, purge briskly; insert a seton under the jaw, and use the poppy fomentation to the eye. As soon as the inflammatory action is on the decline, we may use simply cold spring water, or the following eye-water: sugar of lead and sal ammoniac, each four grains—dissolve them in half a pint of water, to which add forty or fifty drops of laudanum. To remove any remaining opacity, salt finely powdered, or sugar, or glass, may be blown into the eye once a day. Although, after this manner, we may seem to subdue, or parry off a first and even a second attack, still will the disorder, in all probability, sooner or later return, and in the end, almost to a certainty, be productive of blindness.

HAWS, OR HOAKS.

The Haws is a swelling and spunginess that grows in the inner corner of the eye, so large sometimes as to cover a part of the eye.

Treatment—The operation is easily performed by cutting part of it away, but the farriers are apt to cut too much of it away; the wound may be dressed with honey of roses, and if a fungus or spungy flesh arises, it should be sprinkled with burnt alum, or touched with blue vitriol.

GONORRHŒA.

If a simple Gonorrhœa, or simple gleet be observed to drip from the yard (which is often the case in high fed young horses, when a relaxation of the glands and seminal vessels has been brought on by frequent emissions) let the horse be plunged every day into a river or pond; give him two or three purges at proper intervals, and intermediately the following balls:—Take balsam copavia, Venice turpentine, olibanum and mastich, powdered, of each two drachms, bole ammoniac half an ounce, make into a ball with honey, and give it night and morning, till the discharge lessens, and then every night till it goes off.

COMMON FEVER.

In this disease the horse appears dull and heavy, hangs down his head, and moves sluggishly and aversely; his legs and ears are cold, his coat stares, and the skin may have been observed to shiver, in places; these constitute the primary or precursory symptoms, and are not invariably present—indeed horses are subject to few disorders which are not attended with more or less fever. These symptoms are succeeded by the more essential ones, preternatural warmth in the skin and tangible internal parts, and sometimes even in the hoofs—mouth dry, tongue fumed, quick pulse, breath drawn with unusual movement of the flanks, (but not painfully or quickly, for that would denote another disorder,) increased irritability so that the least noise or unusual sight alarms him, and quickens his pulse and breathing. To these may be added loss of appetite, costiveness, urine scanty and often discharged.

Cause.—Fever may commonly be referred to change of temperature, irregular applications of cold and moisture, and vicissitudes in the conditions of the atmosphere, may give rise to fever.—High feeding and confinement have also some share in its production.

Treatment.—If there is reason to think the fever inflammatory, it will be proper to bleed to the amount of two or three quarts, and give him daily some mild physic, such as castor oil, or linseed oil, in order to keep the bowels regular, and in the latter periods of the disease, and frequently in the earlier stages, it may be necessary to administer an injection daily, and a dose of either of the oils above mentioned, at intervals of several days, and give him as much cold water as he may want to drink, even ice cold. It is admitted by recent practitioners that cold water is as good a febrifuge as any medicine that can be given.

COMPOUND, OR TYPHUS FEVER.

The symptoms of this disease are—a slow fever, with great depression; and sometimes inward heat and outward cold, and at other times heat all over, but not excessive. The horse's eyes are moist and languid; his mouth is almost continually moist; so that he is not desirous of drinking, and when he does drink, a very little satisfies him; he eats very little, and moves his joints in a loose, feeble manner, grating his teeth very disagreeably; his body is generally open, his dung soft and moist, and he stales irregularly, sometimes making little water, and at others a large quantity, which is of a pale color, and has very little sediment.

Treatment.—If bloodletting is practised at all, it should be in the early period, at the very onset, if practicable, but in many cases it does not appear to be productive of advantage. Refrigerent remedies are extremely valuable in this disease, and the best of these is sponging with tepid or cool water, which may be practised with advantage whenever the skin is steadily hot and dry.—The effect it produces is in the highest degree salutary.

The occasional use of mild purgatives should be attended to, and in the latter stages of the disease, daily injections is important.

Diaphoretics, (medicines which produce perspiration) have been extensively employed, but recent practitioners doubt their efficacy.

The horse's diet should be scalded bran; and linseed, boiled, and worked up with bran.—Also give him the best of hay, a handful at a time.—It is often necessary to feed him by the hand, for sometimes he is not able to lift his head to the rack. Allow him to drink as much cold water (ice cold) as he may want, for, as before remarked, cold water is one of the best febrifuges we are in possession of and will cool a fever better than any other medicine. Mr. Knowlson recommends the following in the highest terms. Take

Camphor dissolved in Spirits of Wine, 1 oz.—Sal Ammoniac, 1 oz.—Good Vinegar, 1 pint.

Put them all together, and stir them about till the fumes subside. This is for two doses, to be taken at twelve hours distance, diluted with water. This prepartion, he says, will promote urine and perspiration.

If the horse be costive, injections, or an opening drink, should be given; and should he purge moderately, be careful not to suppress it; but if it continue so long as to enfeeble the horse, give him a little red port wine and bark.

Particular regard should be paid to his staling, which, if it flow in two great quantities, must be repressed by proper astringents, and by giving him lime water; and, on the other hand, if he stale so little as to occasion a fullness or swelling in his body and legs, give him the following drink.

Take Nitre, 1 oz.
Castile Soap, 2 oz.
Venice Turpentine, 1 oz.
Oil of Juniper, 2 drachms.

Make them into a ball with liquorice powder, and give them at twice, twenty four hours distance. These balls may be given as occasion may require.

These are the best methods of management, and will generally prove successful; but sometimes art will fail, and the horse will discharge a greenish or a reddish gleet from his nostrils, and sneeze very frequently; he will continue to loose his flesh, (become hide-bound) refuse his feed, swell about his joints, and his eyes will appear fixed and dead; a purging also ensues, and a dark colored fœted matter is discharged. When these symptoms appear, the case may be considered desperate, and all attempts to save the horse will be fruitless.—But on the contrary, when his skin feels kind, his ears and feet continue moderately warm, his eyes look lively, his nose remains clean and dry, his appetite mends, he lies down with ease, and dungs and stales well, you may conclude that the danger is nearly over.

In this disease you must take care not to let the horse eat too much; for his diet should be light, and in small quantities at a time, and increased gradually as he may gain strength; for by overfeeding you will run the risk of bringing on a bad surfeit. His legs will probably be subject to swell; and if the swelling leave a dimple when you press your finger upon it, it is a sign of a dropsy; in which case it will be advisable to put two rowels on each side of his belly, and give him half an ounce of the best yellow bark every day for some time. Sometimes a fever leaves a running at his nose, of a thin yellow, gluish matter, and small swellings below his ears and chaps. When you find these symptoms, give an ounce of crocus of antimony every day in a mash of bran, and rub the swellings with mercurial ointment.

FOUNDER, OR FEVER IN THE FEET.

This is an inflammation of the sensitive parts generally contained within the horny cavity.

Symptoms.—The symptoms of malady are so remarkable, that having witnessed one case of it, it is hardly possible ever afterwards to mistake it. The animal cannot tolerate long the pain of bearing his weight upon the affected feet. Should the disease be confined to the fore feet, he will bring the hind ones as far forward as possible under his belly, in order that they may take the principal bearing, but should all the feet be suffering, he will, after having stood for some time, in considerable pain, lie down. It is, however, the posture in which he is observed to be standing, together with the peculiarity of his gait, that proclaims at once the nature of his complaint. And this is confirmed by the intense heat felt on clasping the hoof, a constant thirst, and very often a considerable swelling of the ankles, &c.

Treatment.—As soon as you know that your horse is foundered, bleed him largely, then give him the following mixture.—Take

Oil of Sassafras, 1 oz.
Nitre, a table spoonful.
Spirits, of any kind, half a pint.
Assafœtida, ¼ oz.

And do not permit him to drink for five or six hours, at the expiration of which time, should he not be evidently better, repeat the bleeding, take half a gallon of blood, and repeat the drench the next day; or one ounce of the sassafras oil put into some kind of spirit will answer a very good purpose. It will be well to tie a small cord just above his knees, and bleed in a vein that runs around the coronet, just above the hoof; take from each leg about a pint of blood, and bathe his legs with equal parts of sharp vinegar, spirits, and sweet oil, or lard. The following treatment is said to be efficacious:—As soon as you find your horse is foundered, bleed him in the neck in proportion to the greatness of the founder.—In extreme cases you may bleed him as long as he can stand up; then draw his head up, as common in drenching, and with a spoon put far back on his tongue, pour strong salt, until you get him to swallow a pint.—Be careful not to let him drink too much.—Then anoint around the edges of his hoofs with spirits of turpentine, and your horse will be well in an hour. Or the following:—Take a large kettle of water and make it boil,—lead the horse to the kettle, if he be able to walk, if not, take the water to him.—Commence with a swab and wash the left fetlock before, then the right, then the fetlocks behind, then wash the legs in the same manner, then the shoulders and body, rub the horse dry, and he will be well in a few hours. There is no danger of scalding the horse, if the above directions be used. This remedy is on the authority of one of the best farriers.

GLANDERS.

This is a dangerous contagious disorder, affecting the membrane that lines the nose, and occasioning a profuse discharge from the nostrils; the discharge is sometimes of a deep yellow, and sometimes of a bloody appearance. This disease is one of an extremely fatal character, almost hopeless.

Treatment.—It has been suggested that the chlorides of lime, or soda, should be administered internally. Turpentine embrocations have likewise been advised, employed as warm as they can be borne.—Creosote has effected a cure in two cases, by the sedulous employment and injection of a dilute solution thrown up the affected nostrils.—Take Creosote, 4 drops.—Water, 4 ounces.

THE HIDEBOUND.

This disorder is too often brought on by the horse being worked too hard, and badly kept; although this is not always the case.—When the skin of a horse sticks so close to his ribs that it appears immoveable, the horse is said to be hidebound. But this is not properly a disease, but rather a symptom, being often caused by previous disorders, such as fevers, convulsions, surfeits, worms, or disorders of the kidneys or lungs.

Cure.—As the hidebound may proceed from various causes, it is necessary to determine the cause, before such medicines can be applied as will remove it.

If it owe its origin to hard labor and want of food, rest and plenty will soon remove it. If it be caused by worms, worm medicines must be applied; or if it be left by any imperfectly-cured disorder, the folowing drink must be given.

2 oz. of Aniseeds, in powder. 2 oz. of Ginger, in powder. 2 oz. Mustard.
1 oz. of Grains of Paradise. 2. oz. of Turmeric.

All to be powdered, and to be given in warm ale, fasting, and to fast two hours after. Give warm water two or three times. Bleeding, tapping, and physic, are also necessary when the hidebound is left by any disorder.

BLOOD LETTING.

Bleeding is often the most useful and efficacious means of curing diseases in horses. In inflammatory affections, it is generally the first remedy resorted to, and its immediate salutary effects are often surprising. When it is necessary to lessen the whole quantity of blood in the system, open the jugular or neck vein. If the inflammation is local, bleed when it can be conveniently done, either from the part affected, or in its vicinity, as by opening the plate vein, superficial vein of the thigh, or temporal artery. A horse should never be suffered to bleed upon the ground, but in a measure, in order that the proper quantity may be taken. The neck is the safest place to bleed, or in what is called jugular vein, and it should be observed to bleed near the head, and not, as is frequently done, down the middle of the neck which will often cause a swelled neck, if not a mortification. This arises from the escape of blood underneath the skin and will require nothing more than a vinegar and water lotion, and some aperient or diuretic medicine, internally, to disperse it.

WOUNDS.

Wounds are of three kinds, viz: incised, punctured, and contused; the first step in all wounds, is to stop the bleeding; when the situation will admit of it, a dossil of lint, placed upon or in the wound and, secured by a firm bandage, will often be effectual. If the vessel is but partly closed by the pressure of the lint, yet that may be sufficient to produce a coagulation of the blood, and the consequent stoppage of the stream.

The next preferable way of proceeding is to endeavor to pass a ligature round the bleeding vessel. This is often practicable by means of a tenaculum, or any hooked instrument, by which it may be drawn a little from its situation, and some waxed silk or twine passed round it.—Sometimes it may be laid hold of with a pair of forceps, or small pincers, and so secured; or, should neither of these methods be practicable, a crooked needle, armed with waxed silk, may be plunged into the flesh or cellular membrane in two or three places, around the wound, and when the silk is tightened the vein or artery will probably be compressed and closed. The hot iron is sometimes applied, but usually a great deal too hot, so as to destroy the life of the part, instead of simply searing it, and thus causing renewed hæmorrhage when the dead part is thrown off. You should clean the wound from all dirt and gravel, which would cause irritation, and prevent the healing of the part. A good fomentation of warm water will effect this, and at the same time will help to abate any inflammation which may probably have arisen.

If it is a lacerated wound, we must try how neatly we can bring the divided parts together. If there are any portions so torn as to prevent us from doing this completely, they should be removed with a knife or a sharp pair of scissors. Then, when the edges are brought well together, they should be retained by passing a needle and strong waxed twine deeply through them, making two, or three, or more stitches at the distance of half an inch from each other. A little dry, soft clean tow should then be placed over the wound, and the whole covered by a bandage closely but not too tightly applied. The wound should not, if possible, be opened for two days after the first dressing. If it looks tolerably healthy, and is going on well, it may be dressed with the following ointment:—Take two pounds of lard, half a pound of rosin, melt them together, and when nearly cold, stir in calamine, very finely powdered, half a pound.

If proud flesh should begin to spring, the wound should be first washed with a strong solution of blue vitriol, and then dressed with the tincture of myrrh and aloes, or the above ointment.

If it is a punctured wound, its direction and depth must be carefully ascertained. Fomentations of marsh-mallows, or poppy-heads boiled in water, should be applied for a few days, in order to abate inflammation, and the tincture of myrrh and aloes should be injected into the wound morning and night; the injured parts being covered if the flies are troublesome, but otherwise left open. If the wound runs downwards and the matter cannot escape, but collects at the bottom, and seems to be spreading, a seton should be passed into the original orifice, and directed as far as the very lowest part of the sinus, or pipe, and then brought out.

When a tumor is forming on the shoulder from the pressure of the collar, every effort should be made to disperse it. A saturated solution of common salt will often be useful, or sal-ammoniac dissolved in eight times its weight of water; but the best is the following:—Take bay salt four ounces, vinegar one pint, water one quart, oil of origanum one drachm. Add the oil to the salt first, rub them well down with a little water, then gradually add the rest of the water and the vinegar.

The part should not only be wetted with this embrocation, but gently yet well rubbed in. Should the swelling still increase, and, on feeling it, matter should evidently be formed, the sooner the tumor is opened the better, and the best way to open it is to pass a seton from the top through the lowest part of it.

ULCERS.

By ulcers are meant holes or sores in the skin and flesh, which discharge matter. They are divided into inflamed, fungous, sloughing, and indolent ulcers, in the neighborhood of carious bone, and those attended by a peculiar diseased action.

Treatment.—When these break out, physic, but don't bleed.—Salts is the best physic.—Foment them with warm water, and apply equal parts of turpentine, hartshorne and camphorated spirit. Wash the ulcers several times a day with a solution of the chloride of lime. Give mashes and thick gruel.

TUMORS AND IMPOSTHUMES.

Tumors, or swellings, arise either from external injuries or internal causes. Swellings caused by external accidents, as blows and bruises, should at first be treated with a mixture of calcined green vitriol one drachm, proof spirit tinged with a little bark two pints, or bathe frequently with hot vinegar. If by this method the swelling does not subside, apply, especially on the legs, a poultice of vinegar, oil, and oat meal to be continued twice a day, after bathing, till the swelling abates. In order to disperse the swelling entirely, the vinegar should be changed for liquid opodeldoc, to 4 ounces of which may be added 1 ounce of spirits of ammonia.—But if the swelling fixes under the jaw, behind the ears, on the poll, withers, or in the groins, sheath, &c. it should be encouraged and forwarded by ripening poultices, whenever they can be applied, twice a day, till the matter is perceived to fluctuate under the fingers, when it ought to be let out.

RUPTURE.

In regard to Ruptures, though they are generally divided into particular classes, we shall only observe, that by violent efforts of the horse, or other accidents, the intestines may be forced between the muscles of the belly at the navel, and through the rings of the muscles into the scrotum (or cod bag.)

Symptoms.—The Swellings are generally about the size of a man's fist, sometimes much larger, descending to the very hock ; they are frequently soft and yield to the pressure of the hand, when they will return into the cavity of the belly with a rumbling noise, and in most the vacuity may be felt, through which they passed.

Treatment.—On the first appearance endeavors should be made to return them by the hand, but if the swelling should be hard and painful, in order to relieve the stricture, and relax the parts, through which the gut has passed, let a large quantity of blood be immediately taken away, and the part fomented twice or thrice a day, applying over it a poultice made with oat meal, oil, and vinegar, which should be continued till the swelling grows soft and easier, or the gut is returned. In the mean time it would be proper to throw up emolient oily injections twice a day.—Should the swelling return use a bandage.

POLL EVIL.

Poll Evil is the name given to an abscess or tumor which forms behind the poll, in the cavity between the occiput (or hinder part of the head) and first cervical vertebræ (the uppermost of the neck bones.)

Cause.—It owes its origin to blows, or some other injury, probably to the constant pressure of a stiff, hard or tight head collar.

Treatment.—So long as the skin remains unbroken, the swelling, if soft and yielding, should be frequently fomented, and warm vinegar may be used instead of water ; but if it has become hard, it will be better to rub daily with sal-ammoniac dissolved in vinegar or else to blister it.—Should the inflammation run high, the horse may at the same time be purged, and also if in high condition even bled with advantage.—In case such measures to disperse the tumor fail—should it, in spite of all we can do, continue to enlarge and grow soft, we had better give vent to the matter at once, than wait for its spontaneous issue ; for, when once formed, the matter is apt to burrow between the bones and ligaments, and do a great deal of mischief.—Therefore give it a free outlet, and afterwards search the cavity with a probe in order to inform yourself of the number and direction of any sinuses or pipes, that may lead from the main chasm, which, as far as is practicable, it is generally the best practice to lay open into the great cavity. If the matter flows in great quantities, resembling melted glue, and is of an oily consistence, it will require a second incision, especially if any cavities are discovered by the finger or probe.

Caustic dressings are mostly required in the first instance, and should be persevered in untilthe parts assume a healthy appearance, and the matter discharged is considered what is called "laudable pus." When any dead bone or gristly or sinewy materials remain, to come away, the nitric lotion will be found most proper. A mixture of blue vitriol and oil of vitriol, made into a paste, is also occasionally useful. Some recommend a seton to be used as follows:—Introduce it from the opening above, and it should be brought out at the bottom; the seton should be then daily wetted with the liquid blister.—Should these remedies fail, escharotics will be required in the form of scalding mixture, viz.—Take of train oil one half pint, honey three ounces, spirits of wine four ounces, corrosive sublimate and white vitriol, of each two drachms, mix together in a bottle, then put a sufficient quantity into a ladle with a spout and made boiling hot, which pour into the cavity in a boiling state, the cavity being previously well washed out with a sponge dipped in vinegar. It will be well to close the wound with one or two stiches, after the scalding mixture has been poured into the abscess.—This should remain untouched for several days, and, if a good matter appears, it will do well without any farther dressing, but if the matter flows in abundance and of a thin consistence, the scalding must be repeated until the matter lessens and thickens, and the cure is performed.

The following is given as a never failing cure for this disease, as well as Fistula:

Take a lump of salt, say as large as an egg, the same size of hard soap, and then take a quantity of poke root and boil it separately until it becomes a syrup, (in quantity a pint) then mix the salt and soap with it so as to make a ball.—Wash the place every morning for a week, and a cure is effected. Or the leaf of the evergreen, called the ground ivy, is said to be a never-failing cure. The leaf is gathered and dried before the fire until it can be pounded, when a tablespoonful is mixed with an equal quantity of slaked lime, and the swelling having been laid open to the bone, the mixture is laid on the wound and kept in its place by a bandage. In no instance has the first application failed to effect a cure.

FISTULA.

Properly speaking this is the surgical term for a long, narrow winding sinus or pipe, in any situation or part of the body; but it has, somehow or other, got to mean, in common colloquy, a disease seated in the withers, of precisely the same nature as Poll Evil, consisting of a tumor, or (should that have broken) of an open sore upon or rather at the side of the withers.

In fact Poll Evil and Fistula are identical in their nature, only that one is caused by the head collar, blows &c. while the other originates in the pressure of the saddle, or the harness collar, that it will be unnecessary for us to say more on the subject, but refer you to the subject (Poll Evil.)

CURB.

A Curb is a solid, firm, ill defined tumor, situated upon the posterior part of the hock, about three inches below, but in a direct line with its point. It is most perceptible on a lateral view, being then recognized by a convexity or prominent deviation from the natural straitness of the posterior outline of the limb.

Symptoms.—Recent Curbs, especially such as have made their appearance suddenly, are hot and tender to the feel, and are attended with considerable lameness, but it is quite otherwise with old and callous Curbs, all inflammation having left them, they produce no lameness or pain, on pressure, whatever.

Cause.—Curbs are induced by extraordinary or violent action, and are more likely to occur in young horses, whose hocks have not arrived at their perfect formation and strength.

Treatment.—In undertaking the cure of a Curb our first consideration ought to be to subdue the inflammation, the second to disperse the tumefaction. Drawing blood from the thigh vein, hot fomentations, and discutient lotions aided by a little opening medicine, will effect the former, but the latter can only be accomplished by a repetition of blisters, or by a charge, and in either case the animal should be turned out for six or eight weeks. Should lameness relapse from an old Curb (which every now and then it will do) after the inflammation is subdued, the part should be fired.

QUITTOR.

Quittor is the name for an ulcer upon some part of the circle where the skin and hoof unite, leading to a sinus which runs downwards between the hoof and the sensitive foot.—Commonly this takes place in the inner quarter, in consequence of that being a part frequently bruised by the shoe of the fellow foot, and also in consequence of the inner side being the more frequent seat of corn, of which this disease is occasionally the effect.

Treatment.—The cure should first be attempted with caustics, and one of the best is corrosive sublimate, with the powder of which the sinews should be filled, and afterwards the foot poulticed.—Should this fail, the actual cautery may be employed; with a smooth, cylindrical, blunt-pointed iron, heated to redness, cauterise the sinus, down to its bottom, and on every side, and afterwards fill it with corrosive sublimate. Should these means fail, our only resource is to take away part of the quarter of the hoof, and excise the diseased portion of cartilage. If the matter, by its confinement, has rotted the coffin bone, which is of so soft and spongy a nature that it soon becomes so, you must then enlarge the opening, cut away the rotten flesh and apply the actual cautery, or hot iron pyramidically, and dress the bone with dossils of lint dipped in tincture of myrrh, and the wound with precipitate ointment. When the sore is not enlarged by the knife, which is the best and less painful method, pieces of sublimate are generally applied, which bring out with them cores, or lumps of flesh. Blue vitriol powdered and mixed with a few drops of oil is used also for this purpose, and is said to act as effectually and with less pain and danger. During the operation of these medicines, the foot, I think, should be kept in some soft poultice and care should be taken during the whole dressing to prevent proud flesh rising.

BLOOD SPAVIN, OR BOG SPAVIN.

Blood Spavin is a soft fluctuating tumor absurdly so called, simply because it occupies nearly the same situation as the true or bone spavin, and is simply a dilation of the vein as it crosses the inner and inferior part of the hock, occasioned by the formation of a wind gall underneath it, just above the dilated part. Sometimes it goes through to the back part of the joint, and then it is called thorough pin.—It is not attended with the slightest inconvenience to the animal and therefore it would be folly to interfere with it, but if it is requisite to have it cured it may be effected by repeated blisters and resting the horse. The following ointment will answer:

Take of Common Ointment, 3 oz. Venice Turpentine, 2 oz. Spanish Flies, 1½ drs.
Corrosive Sublimate, 1 drachm. Oil of Origanum, 2 drachms.—Mix.

The hair should be cut off as close as possible before the blister is applied; this should be done in the morning, and the horse's head tied up to the rack all day, so as to prevent his getting off the blister. After the blister has done running, and the scabs peal off, it should be repeated a second time, and if required a third time, in the same manner. Or it may be cured by cutting in and tying up the vein below, so as to prevent any blood from passing through that portion.—Or you may make an incision into the swelling and let out the gelatinous matter, and then dress the wound with a digestive ointment till the bag be destroyed ; but this is a dangerous method.

BONE SPAVIN.

This affection consists of a small bony tumor growing out from the inner and lower part of the joint of the hock. It is a malady of every day occurrence, and yet one that is frequently overlooked. For in the situation in which it occurs, there is naturally a projection, and oftentimes great discrimination is required, combined with an experienced eye and hand, to decide whether there really is preternatural fulness of the part or not. A spavin will, in some instances, occasion exceeding tenderness and lameness, in others it will not in the least affect the natural action of the animal, all which depends on its situation whether it interferes or not with the motion of the joint, as also on the presence of disease or not in the interior of the joint.

Treatment.—Mild medicines should be used if the horse is young, as they will in a short time wear the tumor down by degrees, which is much better than by trying to remove it at once by severer methods, which often have a very bad effect, and produce worse consequences than those they were intended to remove. Blistering will be found to answer better for young horses than anything yet found out; and for an old horse, or one that has come to his full strength, you may add a drachm of corrosive sublimate, finely powdered, to two ounces of the blistering ointment, and stir it well up.

Before these are applied, the hair must be cut off very close, and then the ointment laid very thick on the affected part. It is proper to make the application in the morning, and to keep the horse's head tied up to the rack all day without any litter; but at night he must be littered in order that he may lie down ; and to prevent the blister from coming off, put a white pitch plaster over it, and tie it on with broad tape.—When the blister has done running, and the scabs begin to dry and pull off, it should be applied a second time in the same manner as before, and the second will have a much greater effect than the first.

When the Spavin has continued long, the blister will have to be often renewed, perhaps five or six times ; but it is necessary to observe that after the second time you must not be less than three weeks before you lay on the third, or you will destroy the roots of the hair and leave the place bald. By these means bone-spavin may often be cured ; but when they fail, recourse must be had to firing.

Before you fire a horse for the bone spavin, be careful to take the vein out of the way, for it generally lies over the spavin, and you cannot fire deep enough to come at the callous substance without its removal. In order to destroy the vein, cut a neck through the skin upon it, just before the spavin, and another just above it, and put a crooked needle under the vein, and tie both ends; then cut the vein across between the tyings, above and below, and you may either draw the piece of the vein out or leave it in.—Let the iron you fire with be pretty sharp ; cut four or five inches upon the bone, and let the iron take hold of the superfluous bone, in order that it may waste away by mattering ; and when you have done, lay on some white pitch, pretty hot, and put a cloth round it to keep it on. In three days open the place, and dress it with yellow basilicon ointment.

RING BONE.

Ring Bone is an osseous tumor, situated upon the pastern bone, so called, because very commonly it forms a sort of ring around the circumferent surface of the bone, sometimes only half way round. It is very similar in its nature to splint, or spavin—indeed it originates, like them, in the overstraining of soft parts, which, in consequence, take diseased action, and become converted into bone. Overweighting young horses, or putting them out beyond their powers, are the common sources of spavins, splints, curbs and ring bone.

Ring Bones may be accompanied with lameness, or not, depending on the presence of inflammation and on the degree of it—also, on their volume and situation, so far as they may or may not interfere with the motions of the pastern joint.

Treatment.—Repeated bleedings from the toe, blisters, or first firing, and then blistering, are the only remedies worthy of mention, for them. They will generally yield to the same method of cure as a curb, especially if just coming out.

SPLINT.

This is a hard knot, or small osseous tumor upon the side of the cannon, commonly the inner side. In technical language, and in allusion to the veritable nature, a splint is an ossification of the grissly substance uniting the small to the large metacarpal bone, for we seldom see a splint in the hind leg. They seldom or never occasion lameness, or even inconvenience, and may be regarded with comparative insignificance. Should it be required to treat a splint either on account of its magnitude, or any inflammatory action going on in it, nothing proves so effectual as a repetition of blisters—they, however, should consist of the strongest ointment of cantharides, and the hair should be shorn off the part prior to their application.

A TWITTER-BONE.

A twitter-bone makes a horse very lame, and not fit for work. It keeps throwing a tough white matter out of what is called a pipe. In order to cure it, first find out to where the pipe leads. This you may do with a piece of round lead, the size of a small quill-barrel. Have the following ready, viz:

Half an ounce of Sublimate, in fine powder, put into one ounce of Spirits of Salt; and as soon as the Spirits dissolve the Sublimate, put to it the juice of a middle-sized lemon.

Mix all together, and syringe a squirt full into the pipe when you take the lead out; and when you draw out the point of the syringe, put your thumb upon the place to prevent it coming back again, and then put on a pledget of green salve and tow. Do this every other day, for three or four times, and by this method most twitters may be removed. But, if this method fail, the next thing to be done is to put a hot iron, the thickness of a small finger, where the pipe leads to, and to fill the hole with sublimate, and bind on it a pledget of green salve with a cloth. Let it be five days, and then lay on some more salve and tow, and in five days more the twitter-bone and pipe will come out. The wound must be washed with the following mixture, and dressed with green salve and tow every other day.

1 oz. of Bole.—1 oz. of Oil of Origanum.—4 ozs. of Oil of Turpentine.

Shake them up well together, and they will both help to heal the wound and to bring down the substance. If any more twitter-bone or pipes form, you must take them out in the same manner.

SAND CRACK.

A sand crack is a cleft or crack in the hoof, commonly in the side, rarely in front; and invariably extending from above downwards, in consequence of the fibres of the hoof taking that direction. The ordinary situation for sand crack is the side of the hoof, the quarter just opposite to the place where the heels of the coffin bone terminate, and the reason why it comes in this particular place is, that this is the part of the hoof which is most operated on, either by expansion or contraction. When the crack comes in front it is in the hind hoof. Sould the crack penetrate completely through the sensitive parts, or should it extend to the coronary ligament, it commonly occasions lameness.

Treatment.—All that we can do towards restoration, is to take off all bearing from the cracked part upon the shoe, and at the same time blister the coronet directly above it, in order to produce a united crust, which must grow from top to bottom, before the crack can be obliterated, no sort of union can possibly take place between the horney sides of the crack. Keep the foot cool and moist.—If the crack has extended to the sensible parts, and you can see any fungous flesh, with a small drawing knife remove the edges of the cracked horn that press upon it.—The whole foot should be kept in a bran poultice for a few days, or until the lameness is removed. The following composition may be used: beeswax four ounces, yellow resin two ounces, common turpentine one ounce. Tallow or suet half an ounce, to be melted together.

CORN.

The seat of this disease is one of the heels of the sole of the foot, most commonly the inner heel, because, that being the one which moves the most in action, is more likely to strike against the heel of the shoe, and be bruised, than the other one.—It is very erroneous to suppose that a corn in a horse bears any analogy to a corn in a man's foot; it is quite a different thing; it consists in a bruise of the sensitive parts of the heels, by which their blood vessels become ruptured and blood exudes, which, by penetration, stains the horn with a red or pinked spot.

Treatment.—The remedy for corns consists in preventing the possibility of contact between the bruised part and the shoe, and in poulticing the foot, should there be inflammation existing; if not, in simply stopping it with clay, or any other moist substance, the object being to soften the horn. It is very important, however, to remember that, before this is done, the corn should be pared as thin as possible. Should they show a disposition to grow again, touch it with oil of vitriol or caustic, and dress it with green ointment.

SPRAINS, OR STRAINS.

A sprain is an over stretch of the muscular or tendinous fibres. As the same treatment applies to all sprains we will in the first place show the symptoms and then the proper treatment.

1. SPRAIN OF THE SHOULDER,

May be known by the peculiar gate of the animal, the dragging of the toe, and the circuitous fling he gives the affected limb, in action (confirmed by the absence of any other visible cause for the lameness) are here our only guides; nothing is to be seen or felt about the shoulder; the injury is too deeply seated to show itself by any external signs.

2. CLAP, OR SPRAIN OF THE BACK SINEW.

Clap in the back sinew, means a sprain of the flexor tendons of the leg.—It may and sometimes does take place in the hind legs, but its common seat is one of the fore legs.

Symptoms.—It may be discovered by the swelling which extends sometimes from the back side of the knee down to the heel, but for the most part the horse sets that leg before the other.

3. SPRAIN OF THE STIFLE.

Symptoms.—The horse generally treads on his toe, and cannot set the heel to the ground.

4. SPRAIN OF THE WHIRL BONE AND HIP,

Is discovered by the horse dragging his leg after him, and dropping backward on his heel when he trots.

If the muscles of the hip are only injured, this kind of lameness is cured easily, but when the ligaments of the joint are affected, the cure is often very difficult, tedious, and uncertain.

5. SPRAIN OF THE COFFIN JOINT,

If not discovered in time, there will grow such a stiffness in the joint, that the horse will only touch the ground with his toe, and the joint cannot be played with the hand.

Treatment.—Rest is indispensable in this disease, and is more to be depended on than any medicine, and seldom fails to remove the complaint. If there is much inflammation, bleed moderately and purge until it is reduced, when any stimulating embrocation may be used. If the lameness is in the shoulder, draw blood from plate vein and afterwards apply a mixture of sal-ammoniac one ounce, vinegar and spirits of wine each six ounces, water twelve ounces—mix. Or take whiskey two pints, cloves two ounces, camphor two ounces, red pepper six pods, common salt, a small handful; set them in a warm place for twenty-four hours before using.—Opodeldoc is a good application.

Should either of these, with a state of rest during the time, fail to relieve within the space of a week or ten days, the whole surface around the point of the shoulder (if the sprain be in the shoulder) must be blistered with an infusion of cantharides, (without removing the hair.) If the sprain be the coffin joint the only method of cure is repeated blistering and then firing superficially.

WARBLES.

Warbles are caused by the heat of the saddle, or its uneasy situation.

Treatment.—A warm greasy dish cloth, often applied, will sometimes remove them, or the bruised leaves of Jamestown weed, (or as it is commonly called Jimson weed) laid on will be found beneficial.—Opodeldoc is also very efficacious.

SIT-FAST.

A sit-fast proceeds generally from a warble, and is the horse's hide turned horney, which if it cannot be dissolved and softened, by rubbing with mercurial ointment, must be cut out, and treated then as a fresh wound.

WIND-GALLS.

Wind-galls are dropsical enlargements of little membranous bags called bursæ mucosæ. They are incorrectly named, for in place of air, they contain a fluid very similar to water.—They have various situations in the body; we most commonly find them in the hock and fetlock joints.

Cause.—They owe their origin to hard work, the repeated stretching and straining of the joints in violent exercise, such as racing, which occasions these bags to be filled with fluid, under the pressure of which they gradually yield until they acquire, in some instances, considerable magnitude.—They seem to be productive of no pain, and consequently are not attended with lameness.

Treatment.—From the circumstance of their being, especially when very large, regarded as eyesores, we are often called on to disperse them; and with this view, we may use in succession, bandages, discutient lotions, and, finally, blisters, or the joint may, if required, be fired. When wind-galls make their first appearance, they are easily cured by a bath and bandage, viz.—Boil red oak bark to a strong decoction, add some sharp vinegar and a little alum; let the parts be fomented twice a day, warm as the hand can be held in it; then take a woolen cloth, dip it in the bath, and bind the ancle up tight as possible, without giving pain to the horse. Should this method not succeed, after a thorough trial, the swelled or puffed part should have a blister applied to it, which will generally succeed; or tight bandages and moistening the parts frequently with a strong solution of sal-ammoniac in vinegar may do some good.

MEDICINAL PREPARATIONS.

The following recipes have been compiled from the works of eminent writers, such as BLAINE, CLARK, LAWRENCE, PEEL, WHITE, &c. It is to be remarked, that the degrees of strength in the different recipes are usually regulated by their numbers—the mildest standing first:—

I.—*Alteratives.*

1st.—Pulverized Antimony 2 drachms, Cream of Tartar and Flour of Sulphur, of each, half an ounce.

2d.—Cream of Tartar and Nitre, of each half an ounce.

3d.—Æthiop's Mineral, pulverized Antimony, and pulverized Resin, of each 3 drachms.—Give in a wash, or in oats and bran a little wetted, every night;—or, made into a ball with honey.

II.—*Tonic Alteratives.*

1st.—Gentian, Aloes, Ginger and Blue Vitriol, in powder, of each 1 drachm, Oak Bark in powder, 6 drachms.

2d.—Winters' Bark, in powder, 3 drachms, Green Vitriol (Copperas) 1½ drachms, Gentian, powdered, 3 drachms.

Make either of these into a ball with honey, and give every morning.

3d.—White Vitriol 1 drachm, Ginger or Allspice, ground, 2 drachms, powdered Quassia ½ ounce, Ale 8 ounces.—Mix and give as drink.

4th.—Arsenic 10 grains, Oat Meal 1 ounce.—Mix and give in a mash or moistened oats, nightly.

III.—*Astringent Mixtures for Diarrhœa, Lax, or Scouring.*

1st.—Powdered Ipecacuanha 1 drachm, powdered Opium ½ drachm, prepared Chalk 2 ounces, boiled Starch 1 pint.

2d.—Suet 4 ounces boiled in 8 ounces of Milk, boiled Starch 6 ounces, powdered Alum 1 drachm.

The following has been very strongly recommended in some cases for the Lax in horses:—

3d.—Glauber Salts 2 ounces, Epsom Salts 1 ounce, Green Vitriol (Copperas) 4 grains, Gruel ½ pint.

When the Lax or Scouring at all approaches to Dysentery or Molten Grease, the following drink should be first given:—

4th.—Castor Oil 4 ounces, Glauber Salts, dissolved, 2 ounces, powdered Rhubarb ¼ drachm, powdered Opium 4 grains, Gruel 1 pint.

IV.—*Astringent Balls for Diabetes, or Pissing Evil.*

Cathechu (Japan Earth) ½ ounce, powdered Alum ½ drachm, Sugar of Lead 10 grains, Conserve of Roses, to make a ball.

V.—*Astringent Paste for Thrush, Foot Rot, Foul in the Foot, &c.*

Prepared Calamine and Verdigris, of each ½ ounce, White Vitriol and Alum, of each ½ drachm, Tar 2 ounces—mix.

VI.—*Astringent Washes for Cracks in the Heels, Wounds, &c.*

1st.—Sugar of Lead 2 drachms, White Vitriol 1 drachm, strong infusion' Oak or Elm Bark, 1 pint—mix.

2d.—Green Vitriol (Copperas) 1 drachm, infusion of Galls ½ pint—mix, and wash three times a day.

VII.—*Powder for Cracks, &c.*

Prepared Calamine 1 ounce, Fullers' Earth, powdered, and Pipe Clay, of each 2 ounces—mix, and put within gauze, and daub the moist surface of the sores frequently.

VIII.—*Astringent Paste for Grease.*

1st.—Prepared Calamine, Tutty, powdered, and Charcoal, powdered, of each 2 ounces.

To the above, if more strength be required, add of Alum and Verdigris, each ½ drachm.

IX.—*Astringent Wash for Grease.*

Corrosive Sublimate 2 drachms, Spirit of Wine or Brandy 1 ounce, soft water 10 ounces. Rub the Sublimate in a mortar with the Spirit till dissolved, then add the water. This is a strong preparation, and has often proved successful in very bad cases of Grease which have resisted all the usual remedies.

X.—*Blisters.*—A general one.

1st.—Cantharides, powdered, 2 ounces, Venice Turpentine 2 ounces, Resin 2 ounces, Palm Oil or Lard 2 pounds.—Melt the three latter articles together, and when not too hot stir in the Spanish Flies.

2.—A strong, cheap blister, but not proper to be used in Fevers or Inflammations, as of the lungs, bowels, &c.—Eupliorbium, powdered, 1 ounce, Oil of Vitriol 2 scruples, Spanish Flies 6 ounces, Palm Oil or Lard and Resin, of each 1 pound, Oil of Turpentine 3 ounces,—melt the Resin with the Lard or Palm Oil. Having previously mixed the Oil of Vitriol with an ounce of water gradually, as gradually add this mixture to the melted mass, which again set on a very slow fire for ten minutes or more; afterwards remove the whole, and when beginning to cool, add the powders previously mixed together.

3d.—A mercurial blister for Splints, Spavins, and Ring Bones—of either of the above, 4 ounces, Corrosive Sublimate, finely powdered, ½ drachm.

4th.—Strong liquid blister:—Spanish Flies, in gross powder, 1 ounce, Oil of Origanum 2 drachms, Oil of Turpentine 4 ounces, Olive Oil 2 ounces.—Steep the Flies in the Turpentine three weeks, strain off and add the Oil.

5th.—Mild liquid or sweating blister:—Of the above 1 ounce Olive Oil, or Goose Grease 1½ ounces.

XI.—*Clysters.*

1st.—A Laxative one.—Thin Gruel or broth 5 quarts, Epsom or common Salts, 6 ounces.

2d.—Clyster for Gripes.—Mash two moderate sized Onions, pour over them Oil of Turpentine 2 ounces, Cayenne Pepper ½ ounce, thin Gruel 4 quarts.

3d.—Nutricious Clyster.—Thick Gruel 3 quarts, strong sound Ale 1 quart; or

4th.—Strong Broth 2 quarts, thickened Milk 2 quarts.

5th.—Astringent Clyster.—Tripe Liquor or Suet boiled in Milk, 3 pints, thick Starch 2 pints, Laudanum ½ ounce; or

6th.—Alum Whey 1 quart, boiled Starch 2 quarts.

XII.—*Cordial Balls.*

Gentian, powdered, 4 ounces, Ginger, powdered, 2 ounces, Coriander Seeds, powdered, 4 ounces, Caraway Seeds, powdered, 4 ounces, Oil of Aniseed, ½ oz.—Make into a mass with Honey, Treacle, or Lard, an ounce and a half for a dose.

XIII.—*Chroni's Cough Balls.*

Calomel 1 scruple, Gum Ammoniacum and Horse-Raddish, of each 2 drachms, Balsam of Tolu and Squills, each 1 drachm.—Beat all together, and make into a ball with Honey, and give every morning, fasting.

XIV.—*Drink for the same.*

Tar-water and Lime-water, of each ½ pint, Tincture of Squills ½ ounce.

XV.—*Powder for the same.*

Tartar Emetic 2 drachms, powdered Foxglove ½ drachm, powdered Squills ½ drachm, Calomel 1 scruple, Nitre 3 drachms.—Give every night in a malt mash.

XVI.—*Diuretic Balls.*

Yellow Resin 1 pound, Nitre and Turpentine, of each ½ pound, yellow Soap ¼ pound.—Melt the Resin, Soap, and Turpentine over a slow fire; when cooling, add the Nitre.—For a strong dose, an ounce and a half; for a mild one, an ounce. It should be kept in mind, that mild Diuretics are always equal to what is required; and that strong Diuretics are always hurtful.

XVII.—*Diuretic Powder.*

Yellow Resin 4 ounces, Nitre, powdered, 8 ounces, Cream of Tartar, 4 ounces. Dose—six, eight, or ten drachms nightly, which some horses will readily eat in a mash.

XVIII.—*Urine Drink.*

Glauber Salts 2 ounces, Nitre 6 drachms—dissolve in a pint of water.

XIX.—*Embrocations—Cooling for Inflammation.*

1st.—Goulard's Extract ½ ounce, Spirits of Wine or Brandy 1 ounce, soft water 1 quart.

2d.—Mindererus Spirit 4 ounces, water 12 ounces.

XX.—*For Sprains.*

Salt, powdered, ½ pound, crude Sal Ammoniac 2 ounces, Sugar of Lead ¼ oz., Vinegar 1½ pints, water 1 pint.

XXI.—*For the Eyes.*

1st.—Sugar of Lead 1 drachm, White Vitriol 2 scruples, water 1 pint.

2d.—Brandy 1 ounce, infusion of Green Tea 4 ounces, Laudanum 2 drachms, infusion of Red Roses 4 ounces.

3d.—Rose-water 6 ounces, Mindererus Spirit 3 ounces.

4th.—Corrosive Sublimate 4 grains, Alcohol 1 ounce, Lime-water 1 pint.

5th.—Alum, powdered, 1 drachm, Calomel ½ drachm.—Mix and insert a little at one corner of the eye.—The custom of blowing it in frightens the horse.

XXII.—*Fever Powders.*

Tartar Emetic 2 drachms, Nitre 5 drachms.

2d.—Antimony, powdered, 2 drachms, Cream of Tartar and Nitre, of each 4 drachms.

XXIII.—*Fever Drink.*

Sweet Spirits of Nitre 1 ounce, Mindererus Spirit 6 ounces, water 4 ounces.

XXIV.—*Fumigations for Purifying Infected Stables, Sheds, &c.*

Manganese 2 ounces, common Salt 2 ounces, Oil of Vitriol 3 ounces, water 1 ounce.—Put the mixed Manganese and Salt into a basin, then, having before mixed the vitriol and water gradually, pour them by means of tongs, or any thing that will enable you to stand at a sufficient distance, on the articles in the basin gradually. As soon as the fumes rise, retire and shut up the door close.

XXV.—*Hoof Liquid.*

Oil of Turpentine and Tar, of each 4 ounces, Whale Oil 8 ounces.—This softens and toughens the hoofs extremely, when brushed over them night and morning.

XXVI.—*Purging Medicines.*

Balls—very mild:—Aloes, powdered, 9 drachms, Oil of Turpentine 1 drachm.

Strong:—Oil of Turpentine 1 drachm, Aloes, powdered, 10 drachms.—The Aloes may be beaten with Treacle to a mass, adding, during the beating, the Oil of Turpentine. All Spices, Cream of Tartar, Oil of Tartar, Jalap, &c.. are useless, and often hurtful additions.

XXVII.—*Liquid Purge.*

Epsom Salts, dissolved, 8 ounces, Castor Oil 4 ounces, Watery Tincture of Aloes 8 ounces.—Mix. The Watery Tincture of Aloes is made by beating powdered Aloes with the yolk of egg, adding water by degrees; by these means half an ounce of Aloes may be suspended in eight ounces of water, and such a purge is useful when a ball cannot be got down, as in locked jaw.

XXVIII.—*Scalding Mixture for Poll Evil, &c.*

Corrosive Sublimate, finely powdered, 1 drachm, yellow Basilicon 4 ounces.

XXIX.—*Wash for Coring out, Destroying Fungus, or Proud Flesh, &c. &c.,*

Lunar Caustic 1 drachm, Water 2 ounces.

XXX.—*Wash for Mange.*

Corrosive Sublimate 2 drachms, Spirits of Wine or Brandy 1 ounce, decoction of Tobacco, decoction of White Hellebore, of each 1 pint.—Dissolve the Sublimate in the Spirit, and then add the decoctions.

XXXI.—*Ointments for Healing.*

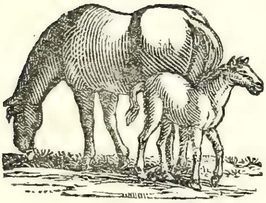
Turner's Cerate 2 ounces, White Vitriol, powdered, ½ drachm, Lard 4 ounces.

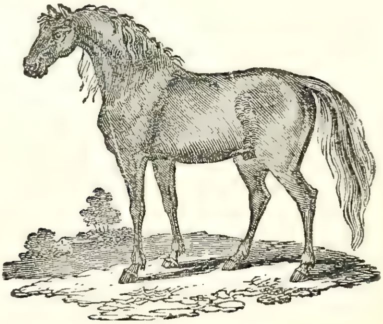
For Mange.

Flour Sulphur 8 ounces, Arsenic, in powder, 2 drachms, Mercurial Ointment 2 ounces, Turpentine 2 ounces, Lard 8 ounces.—Mix, and dress with every morning.

Green Ointment.

Put into a well glazed earthen vessel 2 ounces of Bees-wax, melt it over a clear fire, and add 2 ounces of Rosin; when that is melted, put in ½ pound of Hogs Lard, to this put 4 ounces of Turpentine—keep stirring all the time with a clean stick or spatula (wooden.) When all is well mixed, stir in 1 ounce of finely powdered Verdigris; be careful it does not boil over, strain it through a coarse cloth, and preserve it in gallipots. This ointment is very good for old and recent wounds, whether in flesh or hoof, also galled backs, cracked heels, mallenders, sallenders, bites, broken knees, &c.





REARING AND BREEDING OF HORSES.

In the breeding of the horse, it is important that the parent of either sex be free from disease. It is well known to all breeders, that the diseases of the parents, as well as their good properties, are transferred to their offspring. In breeding, attention should be paid to the female as well as to the male parent, else disappointment may result with respect to the form and properties of the progeny.

A mare is capable of receiving the male at an early age; but it is an error to commence breeding from any mare before strength has been acquired, and her form developed; and this will rarely be sooner than at three or four years of age.

The mare comes into season in spring: she goes with young about eleven months, although with an irregularity, even to the extent of several weeks on either side of that period. The most convenient time for her receiving the male is in May, that she may foal in April, when the herbage begins to spring. From the time she receives the male till that of foaling, the farm-mare may be kept at her usual work. She will give notice of the period of foaling, by the extension of the udder, and other symptoms, and she may then be released from work.

In general, little difficulty or danger attends the parturition of the mare. She rarely requires assistance; but, should difficulty really arise, from the particular position of the fœtus, it is well, if possible, to obtain the assistance of a veterinary surgeon, lest the mare be injured by unskilful and violent means.

As soon as the mare has foaled, she should be placed with her young, either in a house, or, what is better, in a pasture-close, with a shed to which she may go at all times. It is necessary, at this period, to supply her with nourishing food.

It is better that the mother be kept in a field, and permitted to suckle the young undisturbed. But yet she may be put, without danger or injury, to moderate work within a short time after foaling. For a time, the foal should be shut up in a house during the hours of work, which then should not be too long; but, after the colt has acquired a little strength, it may be permitted to follow the mother even when at work in the fields. Many, indeed, do not approve of this practice, on account of the chance of accidents to the foal. But accidents seldom occur, and the foal has an opportunity of taking milk more frequently, is the better for exercise, and becomes used to the objects around it.

In nine days or more after foaling, the mare will be again in season, and may receive the male. In six months the foal is to be weaned, which is done merely by separating it from the dam. It is then best put in a field: the mother is then put to her ordinary work, and treated as usual.

At the time of weaning, and during all the period of its growth, the foal should be liberally fed. Bruised oats, meal, or any farinaceous food, may be given to it. It is not necessary or proper that it be pampered; but it is important to its growth and vigor, that it be supplied with sufficient food.

The male foal intended for agricultural purposes must be castrated; and the best period for performing the operation is at the age of twelve months. Some do it before weaning, but it is better that it be delayed till the masculine form of the animal has been more developed.

If the colt be intended for the saddle, it is well that from this period it be accustomed to gentle handling by the person who feeds it, for this is a mean of rendering it docile and good-tempered. But however this be, nothing but kindness is to be shown to these young creatures, and any thing like rough treatment is to be carefully avoided.

The colts are kept in their pastures during the summer, and when these fail before winter, the animals may be put into a stable or yard with sheds, and plentifully littered with straw, like the young oxen upon the farm. They may receive straw for half the winter, and hay towards spring when the straw becomes dry and unpalatable; and turnips, or any green food, should be supplied to them freely throughout the winter. It is a great error to starve colts, for this injures their growth and vigor in a degree far beyond the value of the increased food required. Although they may be confined in a yard in the manner described, it is greatly better, where convenience allows, that they have a piece of ground on which they may run in winter. This is favorable, in an eminent degree, to their health, and the state of their feet.

But, however the colts are managed in winter, as early in spring as the pastures will allow, they are to be turned out to graze in the fields, where they are to be kept during summer; and in the following winter put again into the yards or paddock, and treated in the same manner as before.

And they are to be treated in a similar manner in the following summer and winter; after which, namely, when three years old, they will be in a condition to be broken in, and, if draught-horses, employed in the work of the farm. They may be taken up for training even in the third autumn of their age, though at this period the work should be very gentle.

A farm-horse usually receives little training, though it is better that a partial training, as in the case of the horse intended for the saddle, be given. But whether this be done or not, the colt should have a bridle with an easy bit put upon him for a few days, and allowed to champ it for an hour or two at a time in the stall. The harness being then put upon him by degrees, he may be trained to the different labors required of him. In general, the farm-horse, working with his fellows, is easily brought to be obedient.

But when a farm-horse is four or five years old before he is put to work, or if he is a stallion, or if he shows any vice, a little more care may be proper, and a partial training, as if he were intended for the saddle, given him. And if he is a valuable horse, and fit also for the saddle and the carriage, the more complete the training given to him the better.

The art of training the horse for the saddle is now well understood, and the rude and violent practices of former times are generally abandoned by all who have any competent knowledge of the subject. In every case, gentleness and kind treatment are to be strictly observed in the management of the colt. He is first to be taught his duties, and corrected afterwards only when necessary to enforce submission. Fear, in the training of the horse, is that feeling with which he is soon endued, that he is under the dominion of a more powerful agent, whose will he cannot resist. Implicit submission is to be enforced, gently in so far as instruction is concerned, but by calling into action the principle of fear, when this is required to produce obedience. Decision and firmness, with a resolution to be obeyed, after the horse has been fairly taught the duties that are required of him, are altogether distinct from violence and cruelty. Nothing is so destructive to the temper of a horse as useless coercion, and all the defects of temper, when they exist in the young horse, arise, in the great majority of cases, from injurious treatment. But we are here chiefly to consider the management of the horse as an animal of labor.

The farm-horse demands, neither in the training nor in the feeding, that nicety which is required in the case of the horse designated for rapid motion or irregular labor. He requires merely to be maintained in good order, never to be worked beyond his power, and never to be allowed to fall, in condition, below the work which he is to perform.

The stable for the farm-horse, as for every other, should be spacious and well ventilated. It is a great error to suppose that horses require a close, warm stable, to preserve them in health. To keep them fully sheltered, and free from the action of any cold current, is all that is requisite. The horse is well suited to bear an equal temperature, but not sudden changes produced by artificial means. Farm-horses regularly worked have been known to be kept throughout the coldest winters in mere sheds, not only without injury, but with greater benefit to their health than if they had been closely confined.

Next to ventilation in importance, is cleanliness of the stable. No filth should be suffered to accumulate, but every day the stable should be cleaned out, with the same attention for the farm as for the saddle-horse. In the farm-horse stable, every ploughman should have a small fork, a curry-comb, a brush, a mane-comb, and a foot-picker.

Light should be admitted into every stable, to a certain extent. But in the case of farm horses, which are only in the stable during the hours of rest and feeding, less light is necessary than in the case of the saddle-horse, which passes a great part of his time within doors. The light required for the farm-horse stable is that which is sufficient to allow the workmen to perform their duties in the day-time. Sometimes there is a room adjoining the stable for holding the harness, but it is perfectly convenient and sufficient in practice, to have the simple furniture of the farm-horse hung on pins in the wall behind each pair of horses.

The food of the horse in this country consists of herbage, or green forage, as clovers and sainfoin; of dried forage, as hay and straw; of various farinaceous substances, as oats, barley, peas, and beans; and of the succulent roots of plants, as the potato, the turnip, the carrot, the parsnep, and the beet. Of the grains given to the horse, the most generally employed in this country, and that which is regarded as well adapted to his strength and spirit, is the oat.

The oat is, for the most part, given to the horse without any preparation, though it is sometimes bruised, which is always beneficial, by rendering it more easily masticated and digested. It is usually given in portions at a time, familiarly known under the term feeds, the measure of which, however, varies in different districts. A feed in some places consists of a gallon, being the eighth part of a bushel, and weighing, upon a medium, about 4½ lbs.

Two gallons in the day, or 9 lbs., are considered to be good feeding when the horse is on dry food, and not on hard work; when on hard work, the quantity may be increased to 3 gallons, and when on light work, and green food, it may be reduced to 1 gallon, and sometimes altogether withdrawn. But on an average, 2 gallons in the day, that is, about 90 bushels in the year, will be sufficient in every case for the working horse of a farm. In practice, too, it is not the superior but the lighter oats that are given the farm-horses. These are the light corn formerly described.

Oats may be given to horses reduced to a state of meal, but this is only practised in the case of gruel given to a sick horse. To induce a horse to take gruel, it is put into a pail and placed beside him, so that when thirsty he may drink of it.

Meal is sometimes given with cold water to horses, when travelling. This is a refreshing feed to a horse on a journey, and a safe one when the chill is just taken off the water; but it is chiefly employed in journeys when time is of importance, and it is accordingly rarely given in the case of the farm-horse, who should always have time given him to feed.

When oats are kept in a damp state, fungi grow upon them, and they acquire a musty smell and bad taste. They should never be given in this state to a horse, but should first be kiln-dried, so as to expel the moisture and destroy the fungi.

Barley is more nutritious than oats, although, in the practice of this country, it is not so much approved of in feeding. But over all the continent, barley is the most common food of the horse. If bruised and mixed with chopped straw or hay, it is an excellent provender. But the most common method of giving barley to horses in England is in what is termed a mash. The barley in this case is boiled in water, and the whole is then allowed to stand until it is sufficiently cool. The mash forms admirable feeding for a sick horse; it keeps the bowels open, and is nutritive, without heating.

Wheat is rarely used for the feeding of the horse, the proper destination of wheat being the food of man. The only case, in general, in which wheat, with a regard to economy, can be applied to the feeding of the horse, is in that of light wheat, which, being made into a mash, may be given to a sick horse in the same manner as barley.

Beans form an esteemed food for the horse. They are somewhat more astringent than oats, and correct the tendency to laxativeness when it exists. They should in all cases be bruised, and mixed with other farinaceous food.

The pea is similar in its feeding properties to the bean, and is even supposed to be more nutritive. It is, however, a dangerous food to be given in too great quantity, from its tendency to swell in the stomach. It should, like the bean, be bruised, and given along with other food.

The details in the manner of feeding the farm-horse necessarily differ according to the practices of different districts. The following is a system, simple, efficient, and capable of being reduced to practice upon every farm:—

When the pastures, or other green food, fail in autumn, which will generally be by the beginning of October, the horses are to be put on hard food. They should receive at this period an allowance of hay at the rate of 20 lbs. in the day, with 2 gallons of oats; or, in place of a portion of the oats, they may receive at night a feed of steamed food, consisting of potatoes, or any other roots, mixed with a little corn, and seasoned with salt. The whole quantity may be a peck, weighing about 12 lbs. The quantity of potatoes that corresponds in nourishment with oats, is in the proportion of about 15 lbs. of raw potatoes to 1 gallon of oats.

In the months of November, December, and January, when the days and the time of labor are short, the hay may be withdrawn, and the horses, in place of it, fed on straw, of which the best, when it can be obtained, is that of beans or peas. Next to these in quality is that of oats. The straw of wheat and barley is in this country only used as litter, though, were it to be cut into chaff, it could be advantageously used as fodder.

At this time the horses should receive 2 gallons of oats in the day; or the quantity of oats may be diminished, and a portion of steamed food given at night. They should receive, as before, two feeds, one in the morning before going to work, and one at mid-day, and their steamed food at night. By the beginning of February, they should again be put on hay, in preparation for their harder work in spring. At or before the time of sowing the oats, that being the commencement of the season of active labor, the horses should receive their full allowance of 3 gallons of oats in the day, or, in place of a portion of their dry oats, a corresponding allowance of steamed food. They should be fed three times in the day, a feed of oats being given in the morning, a feed at mid-day between the intervals of work, and at night they may either receive their third feed of dry oats, or a corresponding quantity of steamed food mixed with their oats.

They are to receive this full allowance of hay and corn until about the beginning of June, when they may receive green food, on which they are fed during the remainder of the season, their daily allowance of oats being reduced to 1 gallon.

Three methods of feeding them on green food may be adopted:—they may be turned out to pasture in the fields; they may have green forage cut and brought home to them in the yards or stalls; or they may be fed in the intervals of work on green food, and turned out in the evening to the fields to pasture.

When the first of these methods is adopted, that is, when the horses are simply pastured, they are merely turned out to the field at night after work; they are caught again, or driven home to the stables, in the morning, and then again turned out after the morning's work, which may be about 10 o'clock, and allowed to feed till the afternoon's work, which may begin about 1 o'clock; they are then caught and again set to work.

The defects of this mode of management are apparent. Time is lost in taking the animals to and from the field during the intervals of work; and then, having to gather their own food, they have too short a time for rest and feeding during the interval.

The second practice mentioned is, to turn the horses out to pasture at night after work, but in the interval in the middle of the day, to give them cut green forage, which is brought home, and given to them in the stall or stable. In this manner they feed at leisure, undisturbed by insects, and having their food collected to them, waste no time in gathering it in those hours which are suffered to elapse between the labor of the morning and that of the afternoon. This is an approved method of managing the horses of the farm. Their health is the better for their being kept out at night, while the advantage of this is combined with the economical practice of soiling.

The other method of feeding is, to keep the horses constantly in the stable, or in a yard with sheds, and to feed them entirely on green forage. There is economy with respect to feeding in this system, and though it would seem to be scarcely so conducive to the permanent health of horses, as to give them a run out in the fields in the summer nights, yet it is found to be perfectly suited to the habits and condition of the farm-horse. Where it is practised, it is better to keep the horses in yards with sheds, than to confine them entirely to the stables. To carry on a system of soiling where clover and rye-grass are the forage plants employed, a quantity of tares, equal to $\frac{1}{4}$ acre for each horse, should be sown, to be given to the horses in the intervals between the first and second cutting of clover, or when they are engaged at hard work in harvest, or at other times.

In the northern parts of this country, farmers cannot generally begin to cut clover till the 1st of June; but in the southern part of the country, the soiling can be commenced much earlier. When there are many horses, one man may be employed to do the work of cutting and putting the cut forage in bunches, and it should be taken home by a spare horse, so as to be ready when the horses return from work. One man will put into bunches a quantity sufficient for 20 horses, and each horse will consume upon an average about 200 lbs. in a day.

When the horses are turned out to the fields at night, and kept on cut forage during the day, they should be put into their stables by the beginning of September, and kept in the house during the night, receiving green forage if it is yet upon the farm, or else receiving hay. By the 1st of October they should generally be put upon hay and corn.

This, then, forms the circle of feeding of the horses of the farm:—They are put on hard food by the beginning of October, receiving hay and a medium allowance of oats. In the months of November, December, and January, their hay is withdrawn, and they are put on straw, receiving a moderate allowance of oats. In February, they are again put on hay, with a full allowance of oats, until about the commencement of June, when they are put on green food, with a lessened allowance of oats, and either fed entirely on cut forage, or pastured during the night, receiving cut forage during the intervals of work in the day.

In the practice of feeding farm-horses, the utmost care must be taken that they never be allowed to get out of condition. In this case, not only are they unable to perform their work, but it requires a much greater expense to bring them again into order, than it would have required to keep them so.

In feeding horses, even when upon hard work, a practice has been introduced of feeding the horses entirely on boiled or steamed food, with chopped hay and straw. The proportions of the different kinds of food employed in this manner are not subject to rule. But about $\frac{1}{4}$ in weight of the whole may consist of the chaff of straw, $\frac{1}{4}$ of the chaff of hay, $\frac{1}{4}$ of bruised or coarsely ground grain, and $\frac{1}{4}$ may consist of steamed potatoes. To this should be added about 2 oz. of common salt. From 30 to 35 lbs. of this mixed provender, or on an average $32\frac{1}{2}$ lbs. in 24 hours, will suffice for any horse.

Two methods may be adopted in the giving of this food. Either the whole substances may be mixed together, and a certain proportion given to the horses three or four times in the day; or the dried food alone may be given during the first part of the day, and the steamed food mixed with a portion of the dried food in a mess at night.

In the first case, that is, when the whole mess is to be mixed together, the potatoes or other steamed food are first to be prepared, then weighed and mixed with the chopped straw or hay, and with the bruised oats.

The quantity for 24 hours being mixed and prepared, the proportion for each horse is to be weighed and set apart in its proper pail, and given to each horse at three or more times, as shall best suit with the work with which he is engaged, taking care that considerably the largest quantity shall be given at night.

When this method of feeding is adopted upon a farm, it should be confined entirely to the months of winter, for the horses of a farm will always be best and most economically fed during the months of summer on pasture and green forage.

From the mixed nature of our husbandry, the habits of the people, and the attention paid to the rearing of the horse, a long and general preference has been given to this animal for the labors of the farm. In certain districts of England the ox is still the more common beast of labor; but in by much the greater number, the ox is either unknown as an animal of draught, or employed only partially as an assistant.

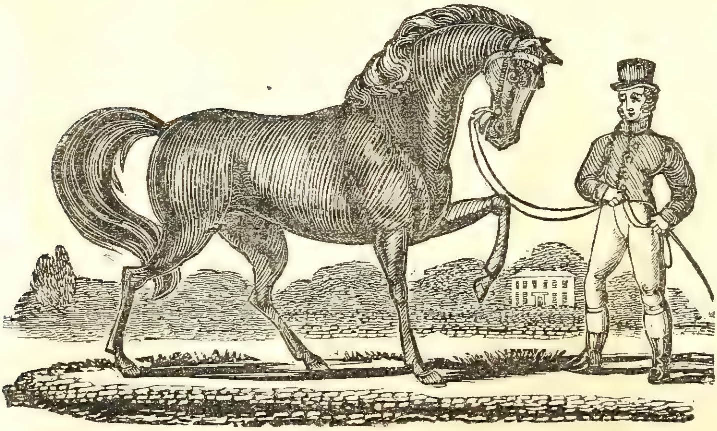
The ox is a less expensive animal to rear to the age of labor than the horse; his subsequent cost of maintenance is smaller; he requires less care and attendance, and he is less subject to accidents and diseases. He has this further advantage over the horse, that, at a certain age, when unfit for labor, he can be fattened, whereas the horse declines after a time, and becomes useless. But the ox, though well suited for a slow and steady draught, such as the plough demands, is not so well adapted for active motion or distant carriages as the horse.—Although patient of labor, he sinks under extreme fatigue, and is not capable of those sudden exertions which the diversified operations of our agriculture require. The horse, therefore, which unites force of draught with quick action, facility of travelling, and the power of bearing great fatigue, is in these respects better suited than the ox to the varied labors of an extended farm. As agriculture, accordingly, has improved, the use of oxen has given place to that of horses for the common purposes of the farm.

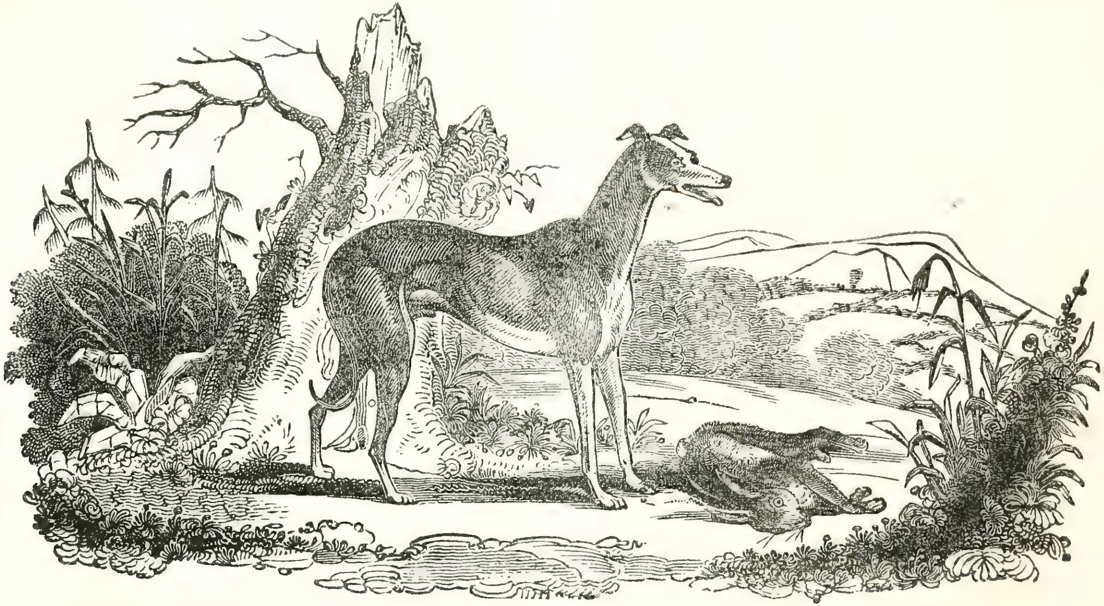
Being thus employed as the principal or only animal of draught on farms of this country, being in universal demand for carriages of every kind, and for the innumerable purposes to which he is adapted, the breeding and rearing of the horse form an important branch in rural economy.

INDEX.

Domestic Animals.—The Horse, - - - - - - - - - - - page 321
How to Choose a Horse, - - - - - - - - - - - - - - 323
Directions for Managing a Horse on a Journey, - - - - - - - - 326
Directions for Riding, - - - - - - - - - - - - - - 328
Compiler's Preface, - - - - - - - - - - - - - - 331
Signs of Disease in Horses, - - - - - - - - - - - - "
Swelled Tongue, - - - - - - - - - - - - - - 334
Lampas, - - - - - - - - - - - - - - - "
Barbs, - - - - - - - - - - - - - - - "
Giggs, - - - - - - - - - - - - - - - "
Dysentery or Bloody Flux, - - - - - - - - - - - - 335
Inflammation of the Intestines, - - - - - - - - - - "
Diarrhœa or Looseness, - - - - - - - - - - - - "
Fatty Diarrhœa, or Molton Grease, - - - - - - - - - - 336
Constipation, or Dry Gripes, - - - - - - - - - - - "
Flatulent Cholic, - - - - - - - - - - - - - - "
Billious Cholic, - - - - - - - - - - - - - - 337
Worms, - - - - - - - - - - - - - - - "
Bots, - - - - - - - - - - - - - - - "
Roaring, - - - - - - - - - - - - - - - 339
Broken Wind, - - - - - - - - - - - - - - 340
Strangles, - - - - - - - - - - - - - - "
Catarrh, or Cold, - - - - - - - - - - - - - - 341
Pleurisy and Inflammation of the Lungs, - - - - - - - - - "
Asthma, - - - - - - - - - - - - - - - 342
Consumption, - - - - - - - - - - - - - - "
Anticor, - - - - - - - - - - - - - - - "
Jaundice, or Yellows, - - - - - - - - - - - - - 343
Inflammation of the Kidneys, - - - - - - - - - - - "
Inflammation of the Bladder, - - - - - - - - - - - "
Diabetes, - - - - - - - - - - - - - - - "
Suppression of Urine, - - - - - - - - - - - - - 344
Mange, or Surfeit, - - - - - - - - - - - - - "
Scratches, - - - - - - - - - - - - - - "
Mallenders and Sallenders, - - - - - - - - - - - - 345
Crown Scab, - - - - - - - - - - - - - - "
Grease, - - - - - - - - - - - - - - - "
Canker, - - - - - - - - - - - - - - - 346
Farcy, or Farcin, - - - - - - - - - - - - - - "
Thrush, or Frush, - - - - - - - - - - - - - - 347
Convulsions, or Stag Evil, - - - - - - - - - - - - 348
Epilepsy, or Sleepy Evil, - - - - - - - - - - - - "
Apoplexy, or Staggers, - - - - - - - - - - - - - "
Tetanus, or Locked Jaw, - - - - - - - - - - - - "
Hydrophobia, - - - - - - - - - - - - - - 349
Inflammation of the Eyes, - - - - - - - - - - - - "
Haws, or Hoaks, - - - - - - - - - - - - - - 350

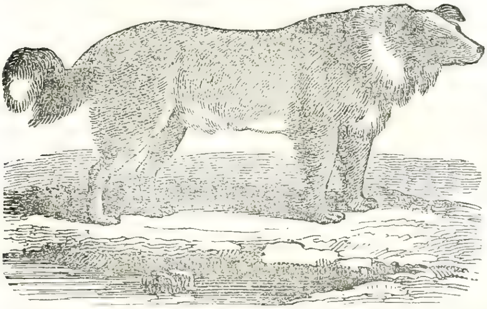
Gonorrhœa, PAGE 350
Common Fever, "
Compound, or Typhus, 351
Founder, or Fever in the Feet, 352
Glanders, 353
The Hidebound, "
Blood Letting, "
Wounds, 354
Ulcers, 355
Tumors and Imposthumes, "
Rupture, 356
Poll Evil, "
Fistula, 357
Curb, "
Quittor, 358
Blood Spavin, or Bog Spavin "
Bone Spavin, 359
Ring Bone, "
Splint, 360
A Twitter-Bone, "
Sand Crack, 361
Corn, "
Sprains, or Strains, "
Sprain of the Shoulder, 362
Clap, or Sprain of the Back Sinew, "
Sprain of the Stifle, "
Sprain of the Whirl Bone and Hip, "
Sprain of the Coffin Joint, "
Warbles, "
Sit-Fast, 363
Wind Galls, "
Medicinal Preparations, "
Rearing and Breeding of Horses, 367





THE DOG.

The bull-dog is not well calculated for a watch-dog, for it attacks in silence, and will kill a child or an innocent person, so as no one at the time would be aware of it. Setters and pointers will do for watch-dogs, as they make a noise before they attack. A little cur dog is a good watch-dog in the house. As the dogs employed in hunting and fowling, generally find a ready sale, and as they can be bred and raised with comparatively but little expense and trouble to the farmer, it ought to be with him an object of some importance. In breeding pointers, setters, and spaniels, or hounds of any kind, great care and judgment are necessary in the choice of stock. They must be crossed like other animals. A small narrow toed, hard, and dark colored foot in pointers and setters, is important, as they are not likely to become foot sore. A narrow headed setter, like a narrow headed hound, can never have a very "good nose." A good breed of dogs require little breaking. In training a dog, a great object is to ascertain his temper; some requiring severe correction, while with others the mildest treatment is necessary. Patience is necessary in a dog breaker. After a dog has been properly brought under subjection, he should be frequently taken out alone, or with another dog, and allowed to hunt whatever he may chance to meet with, till his attachment to the spot has become evident, when he may be checked, and be made steady, and to pursue or stop when he springs his game. A dog is more likely to become a first-rate one by being made a companion of, shaming him when he commits a fault, than by being too much confined till taken into the field, and then flogged into obedience. He should never be kicked, but flogged with a whip carried for the purpose. He may soon be made to point, or to set at game, if he is of a good breed. A few observations on the best mode of breaking the setter and pointer, may be serviceable to the farmer, as he can command a good price for a well broken dog of these kinds. At five or six months old, he may go out with you in your walk, and sometimes lead him with a cord. Let him ramble at a certain distance, so as to be within call, making him come behind you at the word *back*. The fewer words used the better, which should be always the same, of the plainest sound, and distinct from each other. It will not be amiss at this time to teach him to crouch at a piece of bread, &c., and not to stir till he is ordered; this may be done by gentle correction when he does wrong, and by reward when he does right. The word *down* is short, and to enforce it, *sirrah!*—then, *take heed,* and encouragement, as *good boy*. When you flog him in the field, you must not let him run away afterwards, but satisfy him you mean no further punishment. After he comes to a point, the word *toho!* should be used, and then whip him, if he does not obey: if the birds do not rise, he should be allowed to advance, by saying *hold up!* but that he may not advance too rapidly, say *take heed!* When another dog points, the young one must be made to *back*, by calling out to him, *toho!* and holding up your hand. If he does not obey, recourse must be had to the whip. He must never get over any fence before you. He should be gradually accustomed to the sound of fire-arms.—The setter is much better suited to the western country than the pointer, as he is not so tender skinned, being able to enter brush heaps and briar patches, &c., with less injury to his skin. Dogs should be housed in a comfortable kennel, with plenty of clean hay or straw; if with a small yard attached to it, with a high spiked fence, so much the better, as it is less confinement than being tied up, which is necessary to prevent their hunting too much by themselves, as they will most likely in that case be starting rabbits, &c. Until they are fit to be hunted, dogs should be allowed little or no animal food, and fed with flesh only the night before. A slut should not be allowed to breed till she is a year and a half old. The marks of a good shooting dog are these: He should be of good size, head rather large, but not too heavy, large nostrils, heavy drooping ears, full chest, straight legs, sound feet, and wide across the loins; broadness across the nose shews a good nose. The slut should have a strong frame, large ribs, and wide flanks. Wherever a farmer can raise any kind of animals which are profitably saleable, he should endeavor to do so. The setter, pointer, greyhound, and fox-hound, find good prices, in the south, as well as in all cities where visitors from all parts of the union are always to be found.



THE SHEPHERD'S DOG.

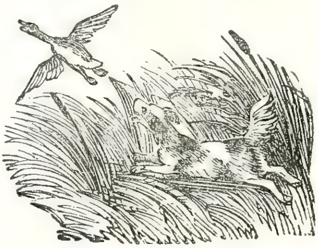
THIS animal is amongst the most useful, performing frequently what is beyond the power of man to do, not only for his greater agility, but from his superiority in some of the senses. In some cases a number of men would be required to perform what is accomplished by one dog in attending sheep.—We copy the following interesting article (says the Boston Cultivator) from a history of the dog lately published in England, which gives some of the characteristic traits of this intelligent and highly valuable animal:

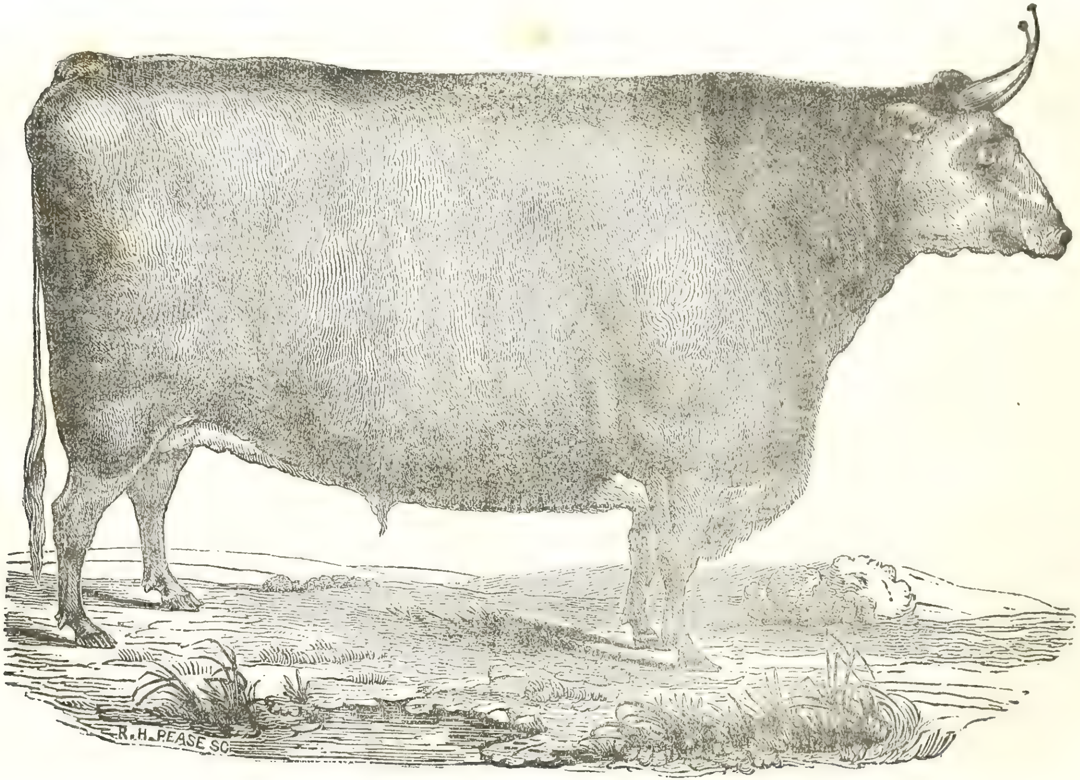
> The shepherd's dog in his own department is a perfect miracle of intelligence. He understands the sign, and voice, the look of his master. He collects the scattered sheep at the slightest signal, separates any one that is indicated from the rest of the flock, drives them all the while under perfect control, less by his active exertions than by the modulations of his voice, which express every tone from gentle instruction to angry menace. These are his ordinary performances, visible every day in a thousand pastures. But he can do greater wonders. It chanced one night that seven hundred lambs, committed to the keeping of the Ettrick Shepherd, broke loose from his control and scampered away in three divisions over hill and plain.—"Sirrah, my man," said Hogg mournfully to his *colly*, meaning it for an expression of grief, and not for a direction, "they're awa." Silently and without his master's knowledge, for it was too dark to see, the dog left his side, while the shepherd passed the hours till morning in a weary and fruitless search after his wandering charge. At the dawn of day he was about to return to his employer with a heart full of despair, when he caught a sight of Sirrah guarding at the bottom of a deep ravine, not, as he first supposed, one division of the lambs, but the whole of the vast flock, without a solitary exception. "It was," says James Hogg, "the most extraordinary circumstance that had ever occurred in my pastoral life. How he had got all the divisions collected in the dark is beyond my comprehension. The charge was left entirely to himself, from midnight to the rising of the sun, and if all the shepherds in the forest had been there to have assisted him, they could not have effected it with greater propriety." On another occasion the same famous shepherd saw a dog, when it was utterly dark, put upon the path of a ewe that had been lost by her owner near a neighbor's farm, and which was supposed to have mingled with her fellows that were feeding in the surrounding pastures. "Chieftain," said the master of the dog, pointing to the spot from which the sheep had gone off, "fetch that, I say, Sir—bring that back; away!" And away he went, and back he brought in half an hour the identical sheep. A sheep-stealer, who was at last discovered and hanged, used to carry on his trade by secretly signifying the particular sheep that he desired out of a large flock, as he viewed them under the pretence of purchasing, to his dog, who returning by himself, a distance of several miles, at night drove the selected sheep, which was undoubtedly the fattest, to his fastidious owner. Both Scott and Hogg relate that picturesque story more circumstantially from the annals of the Justiciary Court in Scotland. Sir Thomas Wilde knew an instance in which three oxen out of some score had mingled with another herd. "Go fetch them," was all the instruction the drover gave his dog, and he instantly brought along with him those very three. A cattle dealer accustomed to drive his beasts for nine miles to Alston, in Cumberland, once for a wager he sent them along with his dog. The animal perfectly understood his commission. He kept the straight road, ran when he came to a strange drove to the

head of his own to stop their progress, put the beasts that blocked the path upon one side, then went back to the rear to hie on his charge, and thus adroitly steering his way and keeping his herd together, he carried them safely to the destined yard, and signified their arrival by barking at the door of the dwelling.

The Diseases of Dogs.—Madness or hydrophobia in dogs, is accompanied by various signs; the chief of which are a disposition to pick up straws, bits of paper, rag, thread, or the smallest objects. Some lick the parts of another dog very much—others will eat their own excrement, and lap their own urine, having a great dislike to strange dogs or cats. As the disease advances, they bite other dogs living with them, and at last, though only in moments of irritability, persons around them. It is a great error to suppose that mad dogs dread water, but it is only from an inability to swallow it. They are, on the contrary, very greedy of it. Every mad dog too is not wild and furious. As the disease advances, his eyes become red, he howls, his ears and head hang down ; sometimes he will eat voraciously, but in general he is dull and melancholy. No remedy has yet been found out for madness in dogs. The only way is to chain him as soon as he is suspected, and then destroy him if necessary. The only way to cure the bite in a human subject, is to cut out the wounded parts, or to suck out the poison strongly for a long time. In *distemper*, the signs are sometimes fits, and sometimes purging, in some cases only cough, running of the eyes and nose. To cure it in the commencement, give vomits for two or three days. Common salt is good—a large spoonful in three of warm water being a dose. Give *flour of sulphur* mixed with molasses, two or three spoonfuls. Another, and the best prescription is—one ounce flour of sulphur, one ounce cold drawn linseed oil, one ounce Saltpetre, one drachm crude antimony, (black sulphuret.) Mix them together and divide them into four doses ; give one dose every day. Keep the dog warm and dry, and give him warm thin milk and water or Indian corn gruel. If much purging, give equal parts gum-arabic and prepared chalk, or from five to fifteen drops of laudanum. Bleed in the early stage of the disorder if there is much inflammation. For *worms*, give a dose of calomel and jalap or aloes. A tea-spoonful of turpentine is frequently successful. For the *mange*, sulphur should be given as a purge, and the skin rubbed with ointment made either of sulphur and hog's lard, with a little turpentine, or train oil one pint, oil of turpentine half a pint, powdered ginger one quarter of a pound, and gunpowder half an ounce. Apply mercurial ointment for the *red mange*. For *fits*, give the same remedies as for worms. For *cholic*, give active purges, mixing castor oil, laudanum, and ether. For *inflamed lungs* and *chest*, bleed. Sulphur as a laxative. For *sore eyes*, wash with water and sugar of lead : if inflammation is violent, bleed. To prevent the ravages of the wood flies, rub his neck and ears, &c. with the juice of the leaves of the walnut, or of dock.

When dogs worry or kill sheep, tie them with a cord to a ram, and let him try to butt them for some time. If poultry, stick the fowls full of pins when dead, and let them bite them. To cure an egg-sucking dog, take three grains of tartar emetic and a tea-spoonful of grated or scraped Indian turnip ; stir them well together in an egg, give it to your dog, and he will ever afterwards turn off in disgust, if you offer him an egg ; a simple, safe, and certain remedy.—*Hooper*.

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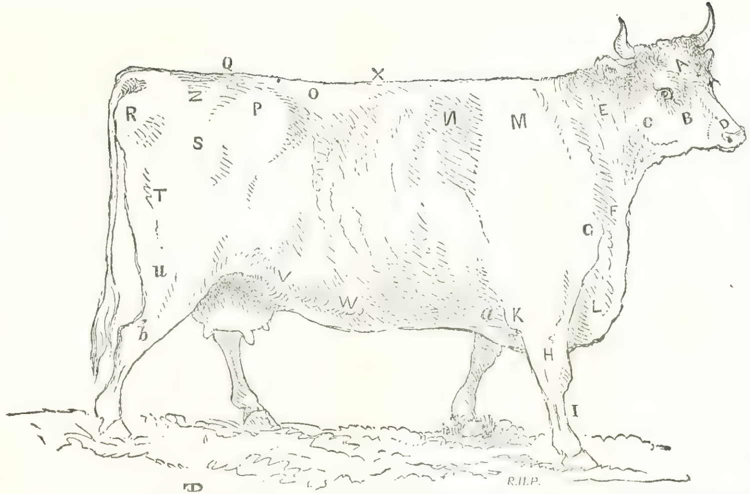

EXPLANATION.

A—Forehead.
B—Face.
C—Cheek.
D—Muzzle.
E—Neck.
F—Neck vein.
G—Shoulder point.
H—Arm.
I—Shank.
K—Elbow.
L—Brisket, bosom, or breast.
M—Shoulder.
N—Crops.
O—Loin.
P—Hip, hucks, hocks, or huckles.
Q—Crupper bone, or sacrum.
R—Rump, or pin bone.
S—Round bone, thurl or whirl.
T—Buttock.
U—Thigh, or gaskit.
V—Flank.
W—Plates.
X—Back, or chine.
Y—Throat.
Z—Hind quarter.
a—Chest.
b—Gambril, or hock.

The above outlined and lettered figure of an animal will be convenient to those who may be at some loss as to the whereabouts of certain points and parts frequently alluded to under terms which, it seems, are not always familiar to some readers.

Rule for ascertaining the Weight of Cattle by Measurement.—A correspondent sends the following from an English paper:—“ Measure the girt close behind the shoulder, and the length from the fore part of the shoulder blade along the back to the bone at the tail, which is in a vertical line with the buttock, both in feet. Multiply the square of the girt expressed in feet, by five times the length, and divide the product by 21, the quotient will be the weight of the four quarters in imperial stones of 14 lbs. avoirdupois. Example:—If the girt be 6½ feet, and the length 5¼ feet, we shall have 6½ multiplied by 6½=42¼, and 5¼ multiplied by 5=26¼; then 42¼ multiplied by 26¼=1109 1-16; and thus divided by 21 gives 52 4-5 stones, nearly; or 52 stones 11 pounds. It is to be observed, however, that in very fat cattle, the four quarters will be about 1-20 more; while in those in a very lean state, it will be 1-20 less than the weight obtained by rule.”

NEAT CATTLE.

The term Cattle, in its most extensive sense, embraces all the large domestic quadrupeds which are used by man for draught or food. In the usual acceptation of the word it is confined to the ox, or what is called black or horned cattle. But as some are not black, and others hornless, the name of *neat cattle* appears more appropriate. The rearing and feeding of cattle is a very important branch of agricultural industry, as much of the prosperity of the farmer depends on the judicious management of live stock, without which his land cannot be maintained in a proper state of fertility.

Of all the species the domestic ox is most generally diffused, and beyond all calculation the most valuable. He has existed in a domesticated state beyond all the records of history and tradition ; and we are, therefore, left to conjecture alone, as to the parent stock. Like all animals necessary to the comfort and subsistence of man, he suits himself in a wonderful degree to the circumstances in which he is placed. In size, he scarce exceeds the deer, in those regions where the herbage is scanty ; but where it is abundant and nutritious, he attains a large growth. He is found from the equator almost to the limits of vegetable life, and is every where subservient to the wants and conveniences of the human race.

The female is in a most remarkable degree subordinate to the interests of mankind. She is every where docile, patient and humble. *Milk*, which forms so nutritive an aliment for the human species, is yielded by her, with an abundance and facility unknown in the case of any other animal. She has a more capacious udder than any creature known to us. Although she gives birth to but one young at a time, she has four teats. Like the sheep and the goat, she yields milk freely to the hand, although far more abundantly ; whilst many other animals refuse their milk, unless their own young or some other animal be allowed to partake of it, by sucking them.

Many circumstances have occurred, stretching through a series of years, to render live stock an object of very great importance to the farmer—and notwithstanding the great advances made, and still progressing in other branches of husbandry, none has undergone a greater change of system, or has received more manifest improvement, than the breeding, rearing, and management of cattle. The varieties of the cultivated ox or cattle, are the European, Indian, Zebu, Surat, Abyssinian, Madagascar, Tinian and African. From the European variety has been found the different breeds cultivated in Great Britain and the United States; our native stock, as it is termed, having been principally derived from England; but many of the cattle of the middle States are descended from the stock originally brought over in great numbers by the early Dutch and German emigrants.

They are very numerous; but we only notice such as are in most esteem, and from which our present stock is derived. We consider it important to our farmers generally, and especially to those who are just entering upon, or are about to engage in the most rational and delightful of all pursuits—agriculture—to have some knowledge of the different breeds or classes of animals. Our limits admonish us of the necessity of brevity, and in our present description of neat cattle, we presume no more than to give a bird's-eye, but still faithful view of the different breeds, their structure, rearing and breeding, mode of management, &c., derived from the best authorities. The varieties of cattle are greatly diversified, both by the different natural circumstances in which they are placed, and by the effects of art in changing their properties and form. To these varieties is generally applied the term *breeds*.

There are great varieties of *breeds* in Great Britain, from whence we have derived our imported stock, almost as various as the districts in which they are reared. As a matter of convenience, they have been classed according to their horns. 1. The *long-horns*, originally improved by that most eminent breeder, Robert Bakewell, became established in the midland counties. 2. The *short-horns*, improved in Durham, whence the latter name, widely diffused throughout the kingdom, especially in all dairy districts, on account of their peculiar milking qualities. 3. The *middle-horns*, a distinct, valuable and beautiful breed, without any mixture whatever with the two preceding classes. These, however, have been intermixed in every possible way, and are found pure only in their native districts—as for instance the long-horns in Leicestershire—the short-horns in Durham—and the middle-horns in Devon. But the more natural, main or proper division of breeds, we conceive to be into those of the *mountains* and those of the *plains*.

The proper form and shape of cattle is a matter of great importance to the farmer and breeder, for whatever may be the breed, there are certain conformations which are indispensable to the thriving and valuable ox or cow. When we have a clear idea of these, we shall be able more easily to form an accurate judgment of the different breeds. If there is one part of the frame the form of which, more than of any other, renders the animal valuable, it is the chest. There must be room enough for the heart to beat, and the lungs to play, or sufficient blood for the purposes of nutriment and of strength will not be circulated: nor will it thoroughly undergo that vital change, which is essential to the proper discharge of every function. We look, therefore, first of all to the wide and deep girth about the heart and lungs. We must have both: the proportion in which the one or the other may preponderate, will depend on the service we require from the animal; we can excuse a slight degree of flatness of the sides, for he will be lighter in the forehead, and more active; but the grazier must have width as well as depth. And not only about the heart and lungs, but over the whole of the ribs, must we have both length and roundness; the *hooped*, as well as the deep barrel is essential: there must be room for the capacious paunch, room for the materials from which the blood is to be provided. The beast should also be ribbed home; there should be little space between the ribs and the hips. This seems to be indispensable in the ox, as it regards a good healthy constitution, and a propensity to fatten; but a largeness and drooping of the belly is excusable in the cow, or rather, notwithstanding it diminishes the beauty of the animal, it leaves room for the udder; and if it is also accompanied by swelling milk veins, it generally indicates her value in the dairy.

This roundness and depth of the barrel, however, is most advantageous in proportion as it is found behind the point of the elbow, more than between the shoulders and legs; or low down between the legs, rather than upwards towards the withers: for it diminishes the heaviness before, and the comparative bulk of the coarser parts of the animal, which is always a very great consideration.

The loins should be wide: of this there can be no doubt, for they are the prime parts; they should seem to extend far along the back: and although the belly should not hang down, the flanks should be round and deep. Of the hips it is superfluous to say that, without being ragged, they should be large; round rather than wide, and presenting, when handled, plenty of muscle and fat. The thighs should be full and long, close together when viewed from behind, and the farther down they continue to be so the better. The legs short, varying like other parts according to the destination of the animal; but decidedly short, for there is an almost inseparable connection between length of leg and lightness of carcass, and shortness of leg and propensity to fatten. The bones of the legs, and they only being taken as a sample of the bony structure of the frame generally, should be small, but not too small—small enough for the well known accompaniment, a propensity to fatten—small enough to please the consumer; but not so small as to indicate delicacy of constitution, and liability to disease.

Last of all the hide—the most important thing of all—thin, but not so thin as to indicate that the animal can endure no hardship; moveable, mellow, but not too loose, and particularly well covered with fine and soft hair.

The WILD BREED, from which the improved breeds have descended, being untameable, are very rarely met with in Europe; a few are to be found, says Mr. CULLY, in the parks of some public spirited gentlemen in England, who have them confined in enclosures, high and firm, for ornament and curiosity. Their color is invariably of a creamy white—the muzzle black—the whole of the inside of the ear and about one-third of the outside from the tips downwards red—horns white, with black tips, very fine and bent upwards. Some of the bulls have a thin upright mane, about an inch and a half or two inches. The weight of the ox ranges from five to six hundred and fifty pounds, and the cows from three hundred and fifty to five hundred pounds the four quarters. The beef is finely *marbled* and of excellent flavor. The mode of killing them was perhaps the only remains of the grandeur of ancient hunting. They are exceedingly shy; the cows hide their calves for a week or ten days, in some sequestered spot, and go and suckle them several times a day.

The *long-horns*, which extend over the western districts of England, and the richer parts of Ireland, were, at an early period, more generally diffused than any of the other races of large cattle. The individuals of this breed are distinguished from others "by the length of their horns, which generally incline downwards—the thickness and fine texture of their hides—the length and closeness of their hair—the large size of their hoofs, and their coarse leathery necks. They are not good milkers." They are frequently termed the *Lan-*

cashire breed. The dristrict of Craven was long celebrated for its long-horns, called the *Craven breed.* In the early part of the last century the *Cauley breed* acquired, and for a considerable length of time maintained, a high reputation, through the judicious and well directed exertions of Mr. WEBSTER, of Cauley. To this breed, and partly derived from it, succeeded the *Dishley breed*, so named from ROBERT BAKEWELL, of Dishley, in the county of Leicester, who, soon after the middle of the last century, began those improvements in live-stock which exercised so great an influence on—not merely on the long-horned breed of cattle—but upon all the varieties and races of domesticated animals in almost every country, down to the present day.

The chief improvements effected, seem to be their early maturity and aptitude to fatten rapidly on the most valuable points, and in the superior quality or excellence of the flesh, it being fine grained, and the fat beautifully intermixed with the muscles. Whatever may be the merits of the long horned cattle, comparatively with the other improved breeds of the present day, it must be admitted, says the Editor of the Complete Grazier, that they rank among the finest in the kingdom; and it is certain, that the perfection which they have attained in the hands of the eminent breeders of the present day, has been acquired throught the medium of the Dishley blood.

The modern improvements made in the long-horned cattle, since the first attempts of BAKEWELL, are considered to consist chiefly in the coarser parts having been reduced, and the more valuable enlarged. The present breed is finer boned, and finer in the neck, throat and breast—the back is straight, wide, and well covered with flesh—the rump is also wide, and particularly fleshy on the points and about the root of the tail.

The SHORT-HORNED CATTLE, under which denomination are indiscriminately included the *Dutch*, *Holderness*, *Teeswater*, *Yorkshire*, *Durham*, *Northumberland*, and other breeds of these varieties of the short-horned breed. The *Teeswater* and the *Durham* varieties of the short-horns, are at present held in the highest estimation; they are very nearly allied to each other; and bulls and cows purchased at the most extraordinary prices, are spread over England, Scotland, and the United States. The enterprising farmers of our western States—indeed our farmers generally, prefer the Durham—hence that variety is more generally found among us.

The bone, head and neck of these cattle are very fine—back level—throat clean—the hide very thin—chine full—the loin broad—the carcass throughout large and well fashioned—quarters long—hips and rumps even and wide—the flesh and fattening quality equal, probably superior to those of any other large breed. They stand rather high on their legs, and handle very kindly. The short-horns are better milkers than any other variety or breed—a cow generally yielding from twenty-four to thirty quarts of milk per day, of the richest quality.* They differ from other breeds, not only in the shortness of their horns, but in their more square and massy form—consequently feeding to greater weight, in affording the greatest quantity of tallow when fatted. The heaviest and largest oxen of this breed, when properly fed, are selected in preference to all others for victualling the East India ships, as they produce the thickest beef, which, by retaining its juices, is the best adapted for all long voyages.

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* The superior *quality* of the milk is disputed by the advocates of the middle-horns.

To Messrs. CHARLES and ROBERT COLLINS, of Darlington, in the county of Durham, belongs the honor of bringing to its present state of improvement, the valuable breed we have now under consideration. Towards the close of the last century, many individuals distinguished themselves as breeders of the Teeswater short-horns. But it was left to these gentlemen to complete what others had undertaken. By judicious and happy selection, CHARLES COLLINS did for the short-horns, what Mr. BAKEWELL, years before, had done for the long-horns. His improvements were made on a better basis, and the result was a superior class of cattle, the reputation of which becoming established about the year 1800, it began to supersede other breeds in every part of the country. This breed received very generally the name of *Durham*, and from it is derived the valuable stock in this country known by that name.

The improved short-horned breed of cattle, was first brought into extensive notice, and its reputation established about the commencement of the present century, by the production of the celebrated "Durham ox," an animal which speaks volumes in favor of a single cross of this blood, for the ox was the produce of a common cow, which had been put to "Favorite," in 1796. In 1801, when five years old, he was thought to be so wonderful an animal, that he was purchased for exhibition, for five hundred and forty dollars—his live weight being then two hundred and twenty-six stone, or three thousand one hundred and sixty-four pounds. The first sale was in February, and in the following May he was sold for eleven hundred dollars, and in two months afterwards eight thousand dollars were offered and refused. He was exhibited in nearly all parts of England to great advantage, until April, 1807, when he was killed, in consequence of having dislocated his hip, eight weeks previously; and notwithstanding he must have lost weight during these eight weeks of illness, his carcass weighed two thousand six hundred and twenty pounds.

Uncommon as this animal then was, he has frequently, of late, been greatly exceeded in every respect, by individuals of the same family in England and in America. There are very many instances in the United States, of cattle possessing every point of excellence, attaining the weight of from three to four thousand pounds. Our limits forbid—indeed it is foreign to our purpose, to notice all the animals reared in this country possessing this peculiar trait. We will, however, advert to one or two. In 1812 the ox "Leopard," reared by Dr. WILLIAM ELMER, of Bridgeton, Cumberland county, New Jersey, weighing three thousand three hundred and sixty pounds, was slaughtered in Philadelphia.

The Duke of Gloucester and the Earl of Jersey, two noble animals of the short-horned Durham, crossed with the native American breed, were raised by that judicious breeder of good stock, Mr.

Edward Tonkin, of Woodbury, Gloucester county, New Jersey. When a little over seven years old they were sold for three thousand five hundred dollars. At the time of sale their weight was as follows: Earl of Jersey, three thousand and forty pounds—Duke of Gloucester, three thousand and forty-two pounds. They were exhibited in various parts of the Union, and in July, 1839, they were estimated by very competent judges to weigh four thousand pounds each.

The **Devon** or **middle-horns**, forms a beautiful and peculiar variety—they are of a family widely extended, as cattle possessing very similar properties are found not only in England, but in America, on the banks of the Don, along the borders of the Vistula, the confines of Poland and many other places. The true Devon, however, is found in the state of greatest purity in Devonshire, and the adjacent counties, in England, and in those sections of the United States whence they have been imported from Devonshire. More allied to the lighter breeds of the elevated countries, than to the larger breeds of the plains, their general form is light and graceful. All writers on live-stock, speak of these cattle, when pure, in the highest terms. **Cully**, **Dickson**, **Marshall**, **Lawrence**, **Berry**, **Robertson**, all express but one opinion; while **Parkinson** says, they are a model for all persons who breed oxen for the yoke.

But we are not to be understood as either advancing or endorsing an opinion that they are superior to all other breeds in every respect. That they possess certain points of superior and peculiar excellence, we cannot doubt. On account of their activity and hardiness, they are admirably calculated for the draught, and they feed well at an early age when not employed in labor; but compared with the Durham they are very deficient milkers. We consider the pure Durham, in the aggregate, as fully equal to the Devonshire. We should be glad to see both breeds more widely diffused throughout our country.

There are a great number of minor varieties of cattle to which the term breeds may be applied, but they are generally inferior in points of excellence to those already noticed, from which our stock have been derived—and which almost, if not entirely, engrossess the attention of American farmers.

Improvement of breeds.—The breed must be adapted to the means, natural or acquired, possessed of supplying food. Art and an improved system of tillage do much in supplying the food of herbivorous animals. By cultivation we can change the nature, and increase the abundance, of the food supplied. But in many cases, tillage is only practicable or expedient to a limited degree, and then the natural pastures of the country must furnish the main supplies of food. In a mountainous country, where the principal food is natural herbage, and where the means do not exist of obtaining artificial food, it would be vain to attempt the rearing of a large and fine breed of oxen. We must, in such a case, be satisfied to rear a race of hardy properties, of small size, and capable of subsisting on coarse herbage. Where, again, art or the natural fertility of a country admits of supplying sufficient food, the study of the breeder should be to select a race of animals, the best that circumstances will allow him to rear.

Having fixed on the kind of breed which is the best suited to the circumstances of the district or farm, the practical question to be determined, is the manner in which a proper breed should be obtained, or the old one improved. There are three methods which may be adopted for this purpose:—

1. The entire change of the existing stock, and the substitution of a different breed, females as well as males.

2. The retaining of the old breed, male and female, and improving them by breeding from the best animals of the same breed.

3. The improving of the breed by crossing with males of a different breed.

When the nature of a farm allows, the most speedy and the best method certainly of attaining the end is to change the stock, and to substitute females of the improved one from which it is proposed to breed. In this manner the purpose will be effected at once, without the labor or loss of time of improving a defective stock.

The second method is the retaining of the existing stock, and improving it by a selection of the best individuals of the same breed. This is the method which ought to be adopted if the breed already existing is sufficiently suited to the natural circumstances of the farm, and to the method of cultivation which can be pursued upon it.

The third method is that of crossing, that is, the retaining of the females, and the employing of males of a different breed. This method has often led to disappointment, from the nature of the crosses attempted, especially where the crosses have been violent, as between animals of very different characters. The first cross in general will be good, but in breeding from the progeny of this cross, expectation will often be disappointed. Not only do the good qualities of the first cross not always remain in the progeny, but often there are found in it defects which cannot be traced to the parents.

This, however, generally arises from *injudicious crossing*. and from unacquaintance with the principle on which the crosses of different animals should be conducted. When a cross is made, it should be with a male of a superior breed; and in this case will be almost always a good animal. To secure the full benefits of the cross, however, we should not too hastily resort to the males of the inferior stock, because it might be found, that, while we had injured the original breed, we had not substituted a better in its stead. The general rule, therefore, should be, to cover again the first cross with a superior male of the same breed, and so on, until the good character of that breed became permanent in the progeny. This is said to be breeding up to the superior stock.

In crossing, the essential characters of form are imprinted on the offspring by the male; and it is surprising in how great a degree this imprinting of better characters takes place, when a male of superior breeding is employed. A first cross between a short-horned bull, for example, fully bred, and a very ordinary cow, produces, not only often, but generally a fine animal, with an extraordinary aptitude to fatten. Many of the very fat animals that receive premiums at the cattle-shows, are extreme crosses of this kind. But the benefit may end with the progeny, if we do not again cover with a male of the same superior breed, and so on until the good characters become permanent.

When a breeder, then, is to improve his stock by crossing, he ought to select a male of undoubtedly superior blood. And he should not generally, after the first cross, resort to the males of the inferior breed, but to those of the superior one, until he has formed, as it were, a breed for himself. There are, indeed, numerous cases in which a single mixture of better blood will do good, as with those inferior breeds which have no fixed characters. These will be improved by even the slightest intermixture with the blood of a better race; and a farmer who is in a district where this class of animals prevails, may safely avail himself of a good male, in the same manner as a breeder of horses would do, although the stallion were of a different character from the native stock. The cases where crossing of any kind is to be attempted with caution, are, when a breed of established good characters, or of characters which fit it for the nature of the country and the state of its agriculture, already exists.

In crossing, then, the rule is, to breed from a male of superior stock; and fortunately, in this country we have now a breed of such established character, that no mistake can arise in the selection of males. These have been formed to our hand, with all the care that art can bestow in improving the form of feeding animals. There is no need, therefore, for those mistaken attempts at crosses which were sometimes made with males of questionable characters. We can predicate nothing securely of the progeny of such crosses as these, the effect of which will probably be to destroy the good properties of either breed, as the aptitude to yield milk of the Ayrshire, and the hardy and feeding qualities of the Galloway. But in crossing with a breed so highly cultivated as the short-horned, the breeder has the assurance that he will produce animals of large size and good feeding properties. He is to consider, indeed, whether he has the means at his command of rearing the larger animals; and if this be so, it will be better that he at once form his stock upon the best model, than run the hazard of wasting time and capital on questionable crosses.

And it must be regarded as highly important as a mean of improving the live stock of Great Britain, that a breed has been formed, by long-continued selection and care, which may always be resorted to, to effect the purposes required, in the same manner as recourse is had to horses of known pedigree, to communicate their characters to the progeny. In this manner the labors of those who have improved the short-horned breed, have extended far beyond what the original breeders contemplated. They have not only improved a peculiar breed, but have furnished the most efficient means that can be used of improving the live-stock of the entire country; and it is to be trusted that the breeders of this class of animals will have encouragement to maintain the characters of the breed with as much care as is used in the case of the race-horse, seeing that it is for a far more important end.

But having selected the breed, or having fixed on the means to be employed for forming it, a point to be determined is the manner of maintaining or improving it, by the selection of good individuals, male and female; for it is to be observed, that it is equally determined, in the case of the ox as of the horse, that the properties of the parents are conveyed to the offspring. The male undoubtedly acts the principal part in impressing his characters on the young. But the *form* of the female is of the *utmost importance;* and if we hope to arrive at success in breeding, the form and characters of the female must be no more neglected than those of the male.

Now we might breed either from animals nearly allied to one another in blood, as brothers and sisters, parents and their offspring, technically termed breeding in-and-in, or from animals of different families. By the latter method are produced animals more hardy and less subject to disease; by the former, we are frequently enabled to produce animals of more delicate form, and greater fattening properties, and above all to give a greater permanence to the characters of the parents in the offspring. It is known, that BAKEWELL and other breeders were enabled, by this system, to give and perpetuate the peculiar characters of their stock. These first improvers, indeed, found the practice to be, to a certain extent, necessary, because they could not resort to the males of other families, without employing inferior animals, and so impairing the properties of their own breed.

It is to be observed, that the breeding and continuing to breed from animals very near of blood, produces animals which have a greater tendency to arrive at maturity, and to become fat. This seems to result from a tendency to premature age in the animal, which thus more quickly arives at its maturity, of bone and muscle, and so begins the sooner to secrete fat.

The system, however, of breeding from animals near of blood, has its limits. Nature will not be forced too far for our purposes. It is known that, although this joining of animals closely allied diminishes the size of the bones, and gives a tendency to fatten to the progeny, it renders them also more delicate and subject to diseases. Although, then, this near breeding may be carried to a limited extent between very fine animals, for the purpose of rendering their qualities permanent in the offspring, we do a violence to nature when we carry it too far. The progeny, along with their early maturity and aptitude to fatten, become feeble; the cows cease to secrete milk in sufficient quantity to nourish their young; and the males lose their masculine characters, and become incapable of propagating their race.

When, therefore, the stock of any farmer has become too nearly allied, he ought not to fail to change his males, and procure the best of the same breed. This is essential to preserve the health of the stock for any time. Great losses have been sustained by breeders who have carried the system of close breeding too far, with the design of pushing the improvement of their breed to its limits.

A character of a breed not to be neglected, is size of the individuals. Although large animals consume more food than small animals of the same species, yet they do not consume food in proportion to their greater size; and hence the benefit of rearing the larger animals, if the natural or acquired productiveness of the farm will allow it. But although size be an important element in the character of a breed, there is another property to which that of size is subordinate, namely, that of a disposition to quick fattening and early maturity. This property depends not on size, but on a different class of characters.

Form.—The principal purpose in rearing oxen, is to produce flesh. The rearing of females for milk is, doubtless, also important; but, in the great majority of cases, this purpose is regarded as subsidiary and subordinate to that of feeding.

There are certain external characters which indicate a disposition in the animal to feed, and certain characters that show that the animal has less of this property, and does not quickly arrive at maturity. These characters are familiar to breeders, and a knowledge of them is readily acquired by practice and observation. But before attending to these characters, it will be well to consider in what really consists the property of quick and easy feeding.

The flesh of an animal, it has been said, consists of muscles. A muscle is a combination of threads or fibres, bound together by a sort of minute mesh-work, to which the term cellular tissue has been applied. Each thread or fibre is divided, so far as the eye assisted by powerful glasses can discover, into smaller fibres still. A number of these smaller fibres or filaments form a fibre; a number of these fibres forms a fasciculus, or bundle of fibres; and a number of these fasciculi form a muscle. Now, surrounding the fibres, the fasciculi, and the muscles, is the unctuous substance, fat. The same matter is formed between the muscular substance and the skin, and surrounds, or is intermingled with, the various viscera with the body. It surrounds, in large quantity, the heart, the kidneys, and other organs.

The muscular fibre grows with the animal, and is essential to its existence and power of motion. When the animal arrives at its full growth, little further addition can be made to the muscle; but it is otherwise with the growth of fatty matter. When the food which the animal assimilates by the action of its organs, is no longer needed to be converted into muscle, it is converted into fat, and this being intermingled with and surrounding the fibres, the fasciculi, and the muscles, the muscles become enlarged. By feeding an animal, then, we have little power over any increase of the muscular substance, but we have a great one over the fatty substance, which, along with the muscle, forms food.

Now, an animal that arrives soon at maturity with regard to the growth of his fleshy fibre, and tends readily to secrete fat, is the kind of animal best suited to the purposes of the breeder and feeder. Such an animal is said to be a quick grower, and kindly feeder.

These properties seem mainly to depend on the power of digestion possessed by the animal. And the external characters which indicate this are a capacity of chest for containining the respiratory organs, and of trunk for containing the stomach and other viscera employed in the process of digestion. This we may infer from the effect; for, in all cases, it is found that the property of quick feeding is combined with a capacious chest and a round body. An animal of this form requires a less quantity of food to produce a given increase of weight, than one whose chest is nrrrow and whose sides are flat. When we look for a feeding animal, therefore, we require that his chest shall be broad, and his ribs well arched; and where this form exists, the back will likewise be wide and flat. We require, too, that the body shall be large in proportion to the limbs, or, in other words, that the limbs shall be short in proportion to the body.

Further, it is to be observed, that, in animals indicating a disposition to fatten, there is a general rotundity of form,—as where the neck joins the head, the shoulders, the neck, and so on,—and that there is a general fineness or smallness of the bones, as of the limbs and head. The limbs being short, the neck is not required to be long, and shortness of the neck, therefore, is a character connected with a disposition to fatten.

The tendency to early growth and kindly feeding is likewise indicated by the touch. This property is known to graziers and breeders, who are all familiar with the soft and delicate feel of a good animal. They call it a mellow feel, the meaning of which it is more easy to conceive than define. It is a certain softness combined with elasticity of the skin. The difference between the skin of a coarse animal and one possessing the peculiar softness here referred to, can, by a little practice, be easily discriminated.

The same characters which indicate a disposition to fatten in the ox, indicate it in the other domesticated animals. The fineness of the bones,—the largeness of the body, as compared with the limbs, neck, and head,—the broadness of the chest,—the roundness of the body,—and the soft and elastic touch,—indicate in all cases this property.*

REARING AND FEEDING.

The period of gestation of the cow is about 40 weeks, varying somewhat according to the constitution of the animal. She is sometimes capable of receiving the male during her first year, but he should not be admitted to her until after she has completed her second year.

Some time after having produced her young, the cow manifests a desire to receive the male. This continues for a few days, and returns at intervals of a fortnight or three weeks. When the male is admitted to her, she is generally at once impregnated. Should this not be so, instinctive desire returns, and she must again be taken to the male until she has been impregnated, which is known by the ceasing of these periodical returns.

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* The following are several of the popular characters which are generally given as indicating the feeding powers of the ox:—1. The head should be fine and tapering to the muzzle, which should be thin. 2. The neck should be free from coarseness, large where attached to the shoulder, and tapering to where it joins the head. 3. The breast should be wide, and projecting well in front of the fore-limbs. 4. The shoulder should be broad, but joining without abruptness to the neck before, and to the chine behind. 5. The back and loins should be straight, wide, and flat. 6. The girth behind the shoulders should be large: the ribs should be well arched, and the distance between the last rib and the hook bone small. 7. The hook-bones should be far apart and nearly on a level with the back-bone: from the hook-bone to the rump, the quarters should be long and straight. 8. The belly should not hang down; the flanks should be well filled up; the legs should be fleshy to the knee and hock, but below the joints they should be tendinous. The tail should be on a level with the back, broad at the top, and tapering to near the extremity. The hoofs should be small; the horns fine and pointed, and slightly attached to the head; the ears thin; the eyes prominent and lively.

It is important to the breeder of feeding cattle that the calves should be born early in the season, so as to afford the means of bringing them well forward upon the summer grass. The proper season for calving is in the months of January, February, and March. When the period of producing the young has arrived, the cow is to be attended to with care, kept in the house, and the birth of the young waited for and assisted when necessary. The position of the fœtus is with the head couched between the fore-legs. When it is otherwise the birth is more difficult and generally the calf must be turned into the proper position.—This is done by the hand, the cow being laid on her side, and gently raised from behind by hoisting. But in general the parturition of the cow is easy.

The calf, on being born, is to be carried away and placed loose in a pen or crib with clean dry litter. The cow should not be suffered to touch or recognise her young, as this only tends to render her uneasy and distressed by the separation. The cow should then be milked and fed with some nourishing food. A sheaf of barley answers the purpose very well, and some nourishing gruel should also be given. An excellent food for some time previous to calving, and some time afterwards, is linseed boiled, or bruised oil-cake dissolved in warm water.

In mountainous countries the cow may be permitted to suckle her calf during the months of summer; and a practice similar to this is frequently adopted with the breeds of the plains. But where a good breed of cows exist, the young should at once be separated from the dam and fed from the pail. The first milk drawn from the cow is viscid, and is peculiarly fitted for the nourishment of the young; for which reason each calf should first be fed by the milk of its own dam.

The quantity of milk given to the young animal should be as much as it can consume, which will be found to be somewhat more than a wine gallon in the day. The quantity which it can consume, however, will gradually increase to 2 gallons more, or 3 gallons in all; and this feeding may be continued for 12 weeks, when the animal is to be put into the course of being weaned, and in one month more completely weaned. The milk given to the calf is new milk, that is, milk directly from the cow. The milk, however, may be economised, by employing substitutes to a limited extent, and, in this manner, the milk of one cow be made to rear more than one calf. The best substitutes are farinaceous food, as meal and porridge. Linseed or oil-cake can be given; by using a little of these dissolved in the milk, its nourishing properties may be increased to any degree required. The calf should be fed three times in the day, regularly at a fixed hour.

After twelve weeks, the use of new milk may be given up and skimmed milk substituted, making it lukewarm, and the quantity gradually lessened; and in the course of one month more, that is, in four months in all, the animal may be entirely weaned.

This indeed is more liberal feeding than is usually deemed necessary; yet it is a great error to stint animals in their food at this age, with the view of economising milk. It is from this cause that so many stunted animals are to be seen in the hands of breeders and farmers, that never afterwards attain to a good size, nor acquire a disposition to fatten.

During the period of feeding with milk, the animals will be taught by degrees to supply themselves with food. For this purpose, when the season is not sufficiently advanced, a bunch of sweet hay, or any green herbs, should be placed within reach of the animals; but a little salt may be given, which they will soon learn to lick, when placed beside them. If the weather allows, they may be turned into a yard for a few hours in the day, and after a time, when the weather becomes mild, into a little paddock containing sweet grass, housing them at first at night, until they shall be fully hardened to the air.

The males, when not intended for propagating, may be castrated when 30 days old. The operation is easily performed, by two incisions with a sharp knife.—An analogous operation, termed spaying, is sometimes performed upon the female, when she is intended for feed; but the more approved practice is to preserve her entire.

The weaning of the calf, it has been said, may take place at the end of four months. The calf is then merely turned into good pasture during the remainder of the season, and fed like the other stock, and generally along with the cows or feeding ox; and, as in the case of all growing animals, it should be allowed ample food.

The subsequent treatment of calves necessarily depends upon the nature of the farm, and the species of food which can be supplied. Where there is nothing but coarse pastures and inferior hay, and when no roots or cultivated forage can be raised, then the stock of the farm must be suited to these circumstances.

In cases where no other food can be supplied than the natural produce of the farm, the same care and delicacy in rearing are not necessary or practicable, as under a more artificial system of feeding. The cows, in such cases, are usually permitted to suckle their young. During the first winter, the young animals receive such pasture and natural hay as the farm affords. In the following summer they are kept on the coarse pastures of the farm; in the following winter they are maintained as in the former one, and so on until disposed of to the feeder, which may be in the second or third, or even sometimes the fourth, year of their age The sooner cattle, under these circumstances, can be brought to maturity, the better is it for the interest of the breeder.

The system of breeding, however, when the nature of the farm is such as to afford a supply of proper food to the animals, and where the finer class of stock is kept, is altogether different. In this case, the principle of the system followed, is to afford a full supply of food to the animal, from the birth to the time that it is transferred to the butcher. This principle applies to all animals intended to be fattened.

The calves, after being weaned, are put, it has been said, on good pasture, and fed for the remainder of the season. When the herbage fails in autumn, the animals should be put in straw-yards, with sheds, into which they may retire for shelter. The number put into one division or yard should not be too great, though this is less important at this period of their life than afterwards. Calves to the number of 20 may be kept together in one yard, provided they have plenty of room; but when animals are of a large breed, it is better that the number should not exceed 10.

The yards should have pure water in each, conveyed to them by pipes, and retained in troughs, to which the animals can have access at all times. Each yard should have, along one at least of the sides, shallow troughs, formed of wood or stone, for the purpose of holding roots, and similar food. The yards should be so dry, that the animals may not be incommoded. Before bringing the calves home for the winter, the yards should be bedded with a layer of coarse straw, or dried stems of plants of any kind. In the middle of each of these yards should be placed one or more racks for containing straw, and preventing its being strewed about. The best kind of straw is oat-straw, and the rack should be kept constantly supplied.

A quantity of turnips (for this we may suppose to be the species of green food used) must be put into the troughs in the morning; again a quantity at midday; and, lastly, a quantity in the evening, before night-fall.

The calves must receive a full allowance of turnips, that is, they must receive as large a quantity as they can consume. At the same time, the racks must be kept always filled with straw, and some litter sprinkled, wherever necessary, over the yards, so as to keep them dry. When straw fails, hay must be supplied, and in place of turnips, should these also fail, potatoes or other succulent food.

In the month of May, generally about the middle of it, in the northern parts of this country, but several weeks earlier in the more southern parts, the pastures will afford sufficient food for the young stocks, which have now completed their first year, and are, in the language of farmers, yearlings, or one-year old. Until the grass is fully ready, the animals should on no account be turned out to the pastures, and care must be taken that the grounds are not overstocked, lest the animals be in any degree stinted in their food. They should at this period be gaining fat as well as growth; and no greater error in the management of feeding cattle can be committed, than to allow their progress to be in any degree checked by the want of sufficient food.

After pasturing for the summer, and at the same period as in the former year, namely, before the end of October, the animals, still yearlings, are taken up from grass.

In the case of the finer breeds, the animals may now be prepared for the butcher; for which they will be ready in the following spring, after being fully fed during the winter, or after having received some grass during the following summer. This is the perfection of rearing and feeding oxen, and the practice shows how great must be the superiority of a breed that can be fattened at this early age. It is only, however, the finer classes of animals, and that under a perfect system of feeding, that can be thus early matured. The more common case is, that they require one winter's feeding more before they are ready for the butcher; and it will be better, therefore, to proceed upon this supposition in describing their further management.

The year-olds, then, are to be taken up from grass as soon as the pastures begin to fail in October or November. They are put into yards with shelter-sheds as before; but, in place of 20 in a yard, there should not be more than 10, the animals being now larger of size, and more apt to interfere with one another in feeding; and they are to be treated in the same manner as during the first winter. They are to be well littered, to be fed three times in the day with turnips, and to receive their full allowance of straw.

It must be observed, however, that this is the period in the age of the animal at which a slight relaxation may be made in the system of full feeding—not that it is well to relax in any degree, but that in practice, with the common supply of food which can be obtained on a farm, it is frequently necessary to do so. But wherever food can be obtained to carry on the system of full feeding during the second winter as during the first, it should be done; for the importance is very great of keeping the animals not only growing, but fattening, from their birth to their full maturity. But if the feeder is unable to carry on the same system of feeding during the second winter as during the first, he may limit the quantity of succulent food, as to the half of the quantity of turnips which the animals, if unrestricted, would consume; giving, however, in all cases, an unlimited quantity of dry provender. In general, however, the necessity for the reduction of the quantity of the richer food is much less than is supposed, for if substitutes for the turnip cannot be obtained, the quantity of stock may be reduced to the means possessed for carrying it on in a proper manner.

In all cases, then, the study of the feeder, must be to carry on the feeding animals with a full allowance of good food from their birth to their maturity. But the period at which he can relax a little in this system of full feeding, and substitute more common provender, is in the second winter. Yet even while he does relax to the extent of diminishing the more feeding food, he must take especial care that the animals, if they shall not gain fat, shall lose no part of their former condition. It is opposed to all the true principles of breeding to allow animals to fall off from the condition at which they had arrived.

It is not necessary, however, after the first winter, to give the same high feeding to the females intended for breeding, as to the males. The object proposed with the females intended for breeding, is not to render them fat, but to maintain them in a healthy and growing state. This is to be done, not by giving them a full allowance of the richer food, but such a portion of it only, as, joined to the more common provender of the farm, will maintain them in a healthy state.—When the yearling steers are to be carried on during their second winter, on a modified, and not a full allowance of richer food, then the heifers need not be separated from them, because both are to be fed in the same manner; but when the steers are at this time to receive full feeding, then the heifers are to be put into a yard with a shed by themselves. They should not be tied to stakes, according to the practice of some, but kept in yards with sheds. In the following summer they are pastured along with the older cows, and receive the male as soon as they are ready to do so, which, in the case of heifers, is later than in that of older cows. When winter comes, they are to be put into their separate pen again, and fed as in the first winter, and when within a few weeks of the period of calving, they may be tied up gently to their stall, or be put into a separate box.

But to return to the feeding stock:—The yearling steers are fed in their yards, either with their full allowance of straw and green food, or else with a full allowance of dried provender, and a modified allowance of green food. By the month of May they have completed their second year, and are now termed two-year-old steers. When the pastures are fully ready for them, they are turned out to feed, and are kept in these pastures until the herbage fails in autumn, when they are to be taken up once more and fed on green food in the fullest quantity in which they can consume it.

Two methods may be adopted in this final feeding of the animals. They may either be tied in the house, having a trough or manger to feed from, or they may be kept in small yards, with open sheds attached.

In the first case, that is, when confined to the house, and fed from a trough or manger, the animals are tied by the neck to upright posts. The best method of attaching them is by a light chain, which encircles the neck, and is fastened to a ring, moveable upon a stake. In this manner the animal has the power of raising and lowering his head with such freedom as permits him to lie down.

But instead of a series of upright posts, it is better that each animal have his own stall. A partition of wood at the heads of the oxen, or a very good substitute, a broad stone, is placed between each animal. A bar of iron is then fastened to the stall, with a ring moveable upon it, to which is fixed the chain which goes round the neck of the animal. In this manner each ox is prevented from interfering with the provender of his neighbor.

The other system of feeding is in small yards, with sheds. Each shed with its yard should be of a size to contain easily two oxen, or, if it is made of a size to hold four oxen, there should be a division between each pair, so that more than two shall not be together; and in the open yard, and close to the wall, should be fixed troughs for holding the provender.

Under this system of feeding, the animals have more freedom than when fed in close houses; and that moderate exercise, which, without impeding their fattening, tends to keep them in health. They receive the benefit of the sun and air, and have always the shelter shed to retire to. They have the power of going to their food at all times, even during the night, and this food being in the open air, is kept always fresh. The treatment of the cattle, too, in these sheds and yards is easy, and the injurious effects to the animals obviated of any deficient ventilation, or any want of care in the management. And experience has fully shown that the finest animals may be fed in these sheds, better even than in the warmest house, when they are tied to the stake.

But the latter practice of feeding is the more common; and it is the most necessary, too, to be described, because it requires greater attention on the part of the keeper.

When the cattle are for the first time to be fixed to their stakes, some care is needed to induce them to go forward. Gentle means must be employed; they must be somewhat tightly tied at first to prevent their turning round; and watched for a time, lest they injure themselves by struggling. They must be well littered, and the turnips placed in the low manger of the stall before them.

Early in the morning the first operation to be performed is, to remove the dung from behind the cattle, and to place the turnips in the stall, the stems and tap-roots having been previously cut off. While the cattle are feeding, the dung is to be wheeled out of the house, and deposited in the yard or dung-pit. When the turnips are eaten up, a little good oat-straw or hay may be placed before the animals; and they being now littered, will soon lie down and chew the cud.

At mid-day they are again to be fed as before, and again before sunset, a little provender of hay and straw being placed before them after each meal; and finally, the keeper, before retiring for the night, is to examine them with a light, see that all is right, stir their litter, and place a little hay or straw before them. Under this system the oxen will be fully fed, and induced during the intervals of feeding to lie down, and left to repose during the night; or they will take a little dry food, should they be inclined to feed. Early in the morning the same process recommences; and the utmost regularity is to be observed in these operations, for the animals know the precise time of feeding, and become restless when it is not observed. Careful feeders currycomb their cattle in feeding, and in all cases observe that the skin is kept free from vermin or other impurity.

Frequently the turnips are cut into slices by the turnip slicer. This, though not essential, is very beneficial, enabling the animals to take the turnips more easily into their mouths, and masticate them. In spring the white turnips decay, and then there should be a succedaneum, first of yellow, and next of Swedish, turnips, which last retain their juices the latest in spring.

If the animals are kept in the yards with shelter-sheds, the principle of feeding is the same as that described; but the dung in this case is not removed from the animals, the litter being spread above it.

An ox of 50 or 60 stone weight will consume about a ton of turnips in the week, or an acre in 24 weeks. If he thrive well, he will gain in weight 14 lbs. or more in the week.

Sometimes cattle, especially when tied to the post, are apt to be choked by a piece of turnip sticking in the throat. In this case, the common practice is, to endeavor to push the piece of turnip gently, but firmly, down into the stomach by means of a flexible stalk, terminating in a round bulb of wood or bone—and it is well to have an instrument of this kind properly constructed always at hand, for use, should occasion require it.

The feeding with turnips is the most simple and economical method practised in this country. Turnips, however, cannot in all cases be raised in sufficient quantity, and in some cases they cannot be produced at all, and then, if a system of feeding is to be carried on, recourse must be had to other substances.

Mangel-wurtzel, the carrot, the parsnep, and the cabbage, are all suited to the purpose of feeding; and the manner of consuming them is so similar to that of the turnip, that when the mode of applying the one is known, that of using the others is easy.

Potatoes are also a nourishing food for ruminating animals. When given raw, they are applied in the same manner as the turnip; but care should be taken to begin somewhat gradually, because this food is apt to scour and injure cattle at first. Potatoes and turnips may, with great advantage to cattle, be given at the same time. Different kinds of food seem to have an exceeding good effect in promoting the tendency to fatten of all cattle; and in the case of feeding with potatoes and turnips, one meal of the former, and two of the latter, in the day, will be found to be a good arrangement. Potatoes steamed may be given to oxen; but steamed food is never of the same advantage to ruminating animals, as to animals with single stomachs, as the hog, &c.

Bruised corn and meal are occasionally employed in feeding; but these are expensive, and only subsidiary to more common food.

Oil-cake is one of the substances employed in feeding. It is highly nutritive, is greatly relished by cattle, and it never fails te increase their tendency to fatten when given with their other food. It may be given in quantities of 2 lbs. or more in the day, along with any other food. It is frequently given with hay alone, and the quantity that will feed an ox, is from 12 to 15 lbs., with half a stone of hay in the day; but this is an expensive feeding, and the better mode of using oil-cake is to give it in small quantities, with less costly provender. It may be given with great benefit along with turnips. In this manner the turnips upon a farm may be economised, and a much greater number of animals matured upon it than would otherwise be practicable.

Salt should be given to feeding animals. The use of this universal condiment in the feeding of oxen, has been known from the earliest times. The quantity given may be from 4 to 5 ozs. in the day to old oxen, to yearlings from 2 to 3 ozs., and to calves ½ oz. All oxen will soon learn to take it if placed within their reach.

The general method of feeding oxen in this country in summer, is in the fields in the manner described; and this is the more simple and easy method, and that which the most likely to be generally followed in a country abounding in pastures. The practice of soiling, however, has been often recommended, and partially adopted, in the feeding of oxen. But this has usually been in favorable situations with respect to productiveness of the soil. It is not a practice well suited to very young stock, which require moderate exercise, and do not grow so well when kept and fed in this manner, as when allowed to pasture in the fields. Soiling, therefore, when it is practised in any case, should generally be confined to the older stock, at the period of their final feeding.

The best method of keeping oxen, when soiled, is in the same small sheds and yards as are employed for feeding on turnips. The food must be carried home, and given to the cattle from racks, in moderate portions at a time. They must be fed three times, and may be fed four times, in the day; and they should be kept carefully littered. Between the period of consumption of the first crop of clover or other green forage and the second, there is sometimes an interval. At this time, therefore, there must be a supply of other food, as of tares, which, if sown in the preceding March, will be ready at this time, and will carry on the cattle until the other forage is ready for being cut a second time.

The rearing and feeding of cattle has been described from the birth to the maturity of the animals; but deviations from the modes described necessarily take place:—The breeder, in the case of certain farms, is not the feeder: He merely rears the animal to the maturity of age, or degree of fatness, which the nature of his farm allows, while other persons complete the process of feeding, in the manner which their peculiar situations render profitable or expedient.

The hardier breeds of the mountains are in general request for being fed in this manner. They are generally purchased lean before winter, and taken to all parts of the low country. They are there fed on straw, or coarse natural hay, during the first winter, with merely such an allowance of green food as can be spared; and they are either grazed and fattened in the following summer, or fed another winter and summer, as suits best with their age and condition.

And not only the mountain breeds, but lean cattle of all kinds, in a more or less advanced state of age and fatness, are in the course of being transferred; and a great part of the profit of farmers depends upon the skill with which, on the one hand, they make their purchases, and, on the other, effect their sales of stock.

Calves, instead of being reared to maturity in the manner described, are frequently disposed of in a fattened state when young. The calves, under this system, may be transferred soon after their birth to the butches, or they may be fed for a longer period on milk. In the latter case, they are rarely good veal in less than 5 or 6 weeks, and the most approved period for keeping them is 10 weeks. They are fed liberally on milk; but linseed cake and other feeding substances may be also employed. The cribs in which they are kept should be perfectly dry, well littered, and ventilated.

Weight of oxen.—The parts of an ox to which the term *offal* is usually applied are the head and feet, the tallow, the hide and horns, and the entrails.

The fat of an ox, it has been said, is that unctuous substance which is intermingled with, and surrounds, the muscles and other parts. That which grows internally is mostly termed tallow, from the uses to which it is applied. The tallow is generally considered to be of the same value, weight for weight, as the flesh of the fore-quarters; and so likewise is the hide. These and the other parts, termed offal, are commonly regarded as forming about one-fifth of the value of the animal.

That portion of the ox which is used for food, exclusive of the offals, is usually termed the quarters, because the animal, on being cut up, is divided into four parts or quarters. The most esteemed parts for food are the hind-quarters. These weigh somewhat less than the fore-quarters; though the more perfect the form of the animal is, the more nearly do the fore and hind-quarters approach in weight.

Practice enables persons to judge of the weight of animals by the eye alone; but it is convenient to be able to ascertain the weight by measurement. This may be done with considerable correctness in the following manner:—When the animal is standing in a natural position, measure his length in feet from the foremost upper corner of the shoulder-blade in a straight line to the hindmost point of the rump; then measure the girth or circumference immediately behind the fore legs; multiply the square of the girth by the length, and this product by 238, which will give the weight of the quarters in stones of 14 lbs. each. This rule has been arrived at, by regarding the body of the animal as a cylinder, and determining, by experiment, what proportion, on an average, the actual weight of the quarters of animals bears to the cylinder.

Another method of ascertaining the weight of fat cattle, is, by weighing them when alive, and multiplying the gross weight by 605. This rule has been arrived at, by determining, from an average of cases, what proportion the dead weight of the four quarters is found to bear to the living weight of the animal.

DISEASES, ACCIDENTS, &c.

The diseases of the larger ruminating animals are not of very frequent occurrence, but when they do take place, they are often dangerous and fatal.—It is therefore important to every farmer, or person having the care of these valuable animals, to inform himself as well as he can as to the best means of restoring them to health, or preventing diseases to which they are known to be subject. In this business nothing, of course, can supply the place of sound judgment, close attention, and some practical experience; and to afford important *help* in acquiring this knowledge is all that we propose in the directions embraced in these pages. In doing this we have availed ourselves of the published experience of the best informed writers who have given their contributions to the public—among them, Youatt, Lawrence, White, Clayter, Skellett, Knowlson, &c. We believe our collection comprises all that can be useful for common purposes, and is as full as the limits of our work will allow.

Great care and good management (says Mr. Knowlson,) are assentially necessary to the recovery and well-being of sick cattle. Without these, in vain may medicines be administered. At the first attack of any disease, solid food should be sparingly given them, and a tolerably warm cow-house receive them. A beast in perfect health has generally more than eighty pounds weight of solid food in the stomach, which of course requires time for digestion.

When a beast is afflicted with any disorder, attention should be paid to the chewing of the cud, and to the manifold, where many a fatal disorder has its seat. Oatmeal gruel seasoned with salt and a little butter, given at the rate of two quarts every four hours, is sufficient support for cattle when afflicted with a disorder. Glauber salts and nitre have a good effect: eight or ten ounces of the former and of the latter to be given in linseed tea once a-day till they recover their cud. Juniper berries are also of great use in recovering the cud: for which purpose they should be given whole into the mouth, to the grinders, five or six times a day.

Cattle in most diseases are fond of fresh mould, in which you may indulge them, being careful to get your mould under a hazel bush, or where it is the sweetest. Let them lick their full of it, for it will never hurt them. A hornful or two of fresh mould and salt may be safely given to a beast which has lost its cud; which in that state very often prefers bad hay rather than good, and you may then let it eat of it as much as it will take.

Linseed tea, with a little butter put to it, is a valuable mixture in almost any disorder. Malt mashes may be safely given when the beast will take them. Bran being often of a very bad quality, is seldom fit to be given to a sick beast; and meal-dust and rough seeds are still more dangerous; for I have known many cows and horses lose their lives from the use of dust and meal-seeds.

It is sometimes hard to find out the disorder of a beast. In all cases examine its breath. If it be strong and offensive, give tea made of bitter herbs, such as wormwood, trefoil, tansey, sanctuary, camomile, pennyroyal, or of some part of them, which will strengthen the stomach and cleanse it. When a beast is taken ill, and the disease is not properly understood, give gruel made of linseed, or of Iceland liverwort, with an ounce of nitre; after which the disorder may be found out and proper medicines applied. If the beast be unable to get up, never sling it, which is unsafe, and often proves fatal to the life of a valuable animal. The surest indications of good health in cattle, are liveliness in all their motions, the hide loose, handling kind in the ribs, a good dew on the nose or nostrils, stretching themselves on rising, and chewing their cud regularly.

INFLAMMATORY FEVER, OR GENERAL INFLAMMATION; CALLED ALSO QUARTER EVIL, BLACK QUARTER, OR SPUD.

This disease frequently happens to young cattle, generally between the first and third year, most commonly about the second year of their age. It appears to be occasioned by feeding them too hastily; by putting them, when in a lean state, into rich succulent pasture.

The animal when seized with this complaint, becomes suddenly listless and stupid; he hangs down his head, refuses his food, and appears to move with difficulty. Swellings soon appear in different parts of the body, which, when pressed by the finger, make a crackling noise. Sometimes the joints are particularly affected; at others, the swelling appears on the back, shoulder belly.

The disease attacks rather suddenly, and often proves fatal, particularly when proper remedies are not speedily employed. Bleeding is the first remedy, and must be proportioned to the age and strength of the animal; perhaps from three to four quarts will generally be found sufficient. The blood should always be measured. The following purgative should then be given.

Aloes, 3 drs.; Potash, 2 drs.; Sulphate of Soda (Glauber Salts) 6 ozs.; Warm Water, 1 pint. Mix for a dose.

This dose will generally be found sufficient for an animal of two years old. Should the disease occur in situations where these medicines cannot be procured, give from four to six ounces of common salt in a pint of water; the addition of four ounces of castor oil, sweet oil, or even linseed oil; will make it more efficacious. Should the animal be relieved, by this treatment, considerable weakness may follow: for which give the following, twice a day:

Powdered Caraway seeds, 1 oz.; Ginger, 2 drs. To be given in a pint of oat-meal gruel (or any other gruel) or ale.

The swollen parts, particularly if the joints are affected, should be rubbed with the following liniment:

Take of linseed oil, 4 ozs.; Oil of turpentine, 2 ozs.; Liquid ammonia, or spirits of sal ammoniac, 1 oz. Mix.

Mr. Lawrence has very properly advised that a piece of short or inferior keep should be reserved as a digesting place, where cattle may occasionally be turned, to empty and exercise themselves. This is better than bleeding, or any medical preventive; and as this disease frequently proves fatal, preventive measures should never be lost sight of.

MURRAIN, OR PEST.

These terms correspond with that of plague in the human species, (and the diseases are said to have a similar origin, to wit, in putrid miasmata,) and like the plague is attended with boils or buboes. The plague of horned cattle is said to be of a peculiar nature, and not communicable to other animals. Yet in a contagious disposition of the air, it may chance that various species of animals may be affected at the same time. The infection is first denoted by a decrease of appetite, difficulty of swallowing, shaking the head, hanging down of the ears, and dulness of the eyes. Constant diarrhœa, or scouring, fœtid breath, nauseous steams from the skin, infecting the surrounding air. The blood is florid, hot, and frothy, and the urine high colored. Roof of the mouth ulcerated. Tumors or biles are felt under the fleshy membrane of the skin; eruptions all along the limbs, and about the bags of the cows. Milk dries up suddenly. The animals groan much, and are worse towards evening, mostly lying down. These symptoms continue increasing until the seventh day, in which, generally, although sometimes protracted to the ninth, the crisis or turn takes place.

Mr. Lawrence advises, on the appearance of the distemper, to place the whole herd under the best shelter that circumstances will allow; to separate those which are in the most advanced stage of the disease, and slaughter such as good judges shall deem to be in a state too dangerous for any attempt to cure, and bury them pretty deep in the ground. In a disease so highly putrid, bleeding should be moderate, yet in the beginning, he thinks it will be necessary, as also setons and rowels. "If costiveness prevail, the body must be kept open by clysters, or the most moderate purges, but a scouring is the most usual symptom. The sick-house must be sufficiently airy, yet well defended from wet and cold. Acid fumigations will purify the atmosphere of the house, and probably the fumes being inhaled by the beasts will have a favorable effect."

The *emphysema*, windy abcess, or puffing up of the hide, filled with a thin putrid matter, and foul air, which nature furnishes in the last stage, as a means of throwing off the disease, must be opened at full length, wherever situated, and the matter discharged. The cavity to be filled with pledgets of tow, dipped in tincture of myrrh, or of an ointment composed of powdered turpentine and yolk of eggs. Poultices of oatmeal, stale beer, &c., may be necessary to bring the ulcers to a proper digestion. Nitre has, of late, been successfully used in gangrenous ulcers, the cavities being filled with it. The approach of mortification is indicated by the dark and flabby appearance of the inside of the mouth, coldness, insensibility, blackness and an ill scent of the dung, sanious and foul discharge from the mouth and nose, and dullness of the eyes. On the return of health, mild, cleansing purges will be necessary, but the danger of mortification must be fairly passed. The recovered beast must not be suddenly exposed to the air, but only turned out a few hours in the middle of the day, particularly throughout winter. Sudden exposure has subjected many convalescents to a vertigo, or giddiness, and consumption.

M. Sauvages, the celebrated professor of medicine at Montpelier, was an accurate observer of this disorder, when it raged with great violence in many of Europe. He calculated that of twenty who were attacked by it nineteen died; that no certain remedy had been discovered, or any effectual mode of preventive, except separating the healthy from the sick; he recommends, however, bleeding and purging at the commencement of the disorder, with setons in the dewlap. After the operation of the purgative, he considers opiates, aromatics, &c., such as caraway seeds, ginger, cascarilla, &c., as the most proper medicine.

A writer in the Gentleman's Magazine, quoted with approbation by Dr. W. Peck, a late learned and judicious writer on veterinary medicine, gives the following directions to prevent and cure the disease.

First. Avoid infection with the utmost diligence. *Secondly.* Trust to none of the celebrated remedies that may be proposed to you, unless founded on experience; most that have been offered by farriers are known to be ineffectual, and many of them extremely injurious. *Thirdly.* If your cattle are attacked, bleed plentifully, repeatedly, and keep their bodies open. *Fourthly.* Give them no dry food from the commencement of the attack till the fever abates; let their mashes be thin, given warm, and very often, a little at once; keep them dry and warm. *Fifthly.* Give no warm spicy drenches, at the commencement of the disease.

CATARRH, OR COLD; EPIDEMICAL COLD; DISTEMPER.

Colds are very common, particularly in wet or cold weather; and though they are often thought of too little importance to require particular attention, yet, by neglecting them, and suffering the animal to continue exposed to the weather, the most serious consequences may ensue. From such neglect we often find that the animal decays in flesh and strength, becomes hide bound, and has a rough staring coat; at length tubercles form in the lungs, the mesenteric glands become enlarged, obstructing the passage by which nutriment is conveyed to the blood: this is succeeded by atrophy, consumption and death. It is highly important, therefore, to attend to this disorder as soon as it is discovered; and it is asserted that more good may be done by nursing, placing the animal in a warm situation, giving him warm nourishing fluids, such as gruel, infusion of malts, &c., than from any medical prescriptions.

Colds are, at some seasons, so prevalent, as to be considered epidemic and infectious. On such occasions they generally occur with great violence, and are accompanied by fever, and soon after the attack, by considerable debility.

On the first attack, the animal appears dull and languid; the eyes are watery, and sometimes partially closed; the appetite is diminished; and most commonly it is attended with cough. Swellings under or below the ears, difficulty in swallowing, and a discharge from the nostrils are symptoms of the complaint. When catarrh prevails to this degree, it is generally named *influenza* or *distemper*, and has been thought contagious, but this opinion has not been proved to be true.

With respect to the treatment of this disease Dr. WHITE observes that the hot stimulating drenches, commonly recommended, are decidedly improper. Bleeding at the commencement of colds is generally proper; the only circumstance which indicates its impropriety, is considerable weakness and low condition. The quantity of blood taken should seldom exceed two quarts. If the animal is costive, give a laxative drink; but if he purges or scours, give the following powder in gruel:

Powdered ginger, 3 drs.; Antimonial powder, 2 drs.; Camphor, 1½ drs.; Tincture of opium, ½ oz.

To be repeated after eight or ten hours, should it be necessary. If there is any difficulty in swallowing, and particularly if it be considerable, the following liniment should be rubbed about the throat:

Take of oil of turpentine and any common oil, of each, 1 oz.; Liquid ammonia, commonly called spirits of sal ammoniac. ½ oz. Mix.

In common cold, however, says Dr. White, "I am inclined to believe that if the animal were placed in a comfortable situation, and well attended to, medicine would be unnecessary. Even bleeding, in common slight colds, is seldom required; but should the animal, by a change of situation, become hot and feverish, should the eyes look red and the flanks move quickly, he should be bled freely; and if in any degree costive, the following laxative.

Sulphate of soda (Glauber's salts) 1 pound; Gruel, 1 quart; Powdered caraway seeds, 1 ounce Mix for one dose.

When there are no feverish symptoms present, the laxative should be mixed with some cordial medicine, such as an ounce of caraway seeds, and three or four drachms of ginger.

When the influenza, or distemper, has not been attended to, or has been improperly treated, at an early period, the animal becomes extremely weak, and every means must be employed to recruit his strength. On such occasions a tonic, such as the first mentioned prescription, may be given twice or three times a day, which in conjunction with a warm nourishing diet, and careful attendance, may ultimately effect a recovery.

If the animal should become costive, a mild laxative will be proper; about half a dose will be sufficient. If grass can be conveniently procured, when the animal is kept under cover a moderate quantity will be useful. In favorable weather, the field is the best place ; but a shelter and warm situation should be chosen.

Whenever the disease appears to be epidemic, preventive means should be adopted, which is more particularly necessary when rain and cold winds prevail. Catarrh or cold is often an insidious complaint, and if neglected, may produce very serious consequences.

Whenever caraway or any of the aromatic seeds are employed, they should not be purchased in powder, as they do not keep well in this form.

Mr. Lawrence observes that " the *influenza* or epidemic cold arises from frequent changes of the air, and the prevalence of north-east and easterly winds. As a great number, whether of men or animals, may be seized with this species of catarrh, at the same time and from the same cause, it has been supposed contagious, which indeed, may probably be the case in its inveterate and putrid state. The disorder is most prevalent in the spring, which succeeds a mild winter, when particular care should be taken that cattle are not exposod to currents of air from the north-east. I have known a whole fold-yard of oxen, horses and cows, dangerously affected in one night."

Mr. Lawrence advises " if the animal shivers with cold, and has cold breath, give a quart of warm ale, (beer or warm water would answer probably as well,) in which is infused a table-spoonful of grated ginger, two of spirits of hartshorn, and one of laudanum, repeating it in six hours, if the chilly symptoms continue, allowing warm water and a deep bed of straw. If feverish heat comes on, give nitre in warm water : when fever becomes predominant, bleed two quarts, unless the animal be a milk cow, which never ought to be bled but in extreme necessity, and one ounce of cream of tartar, in three pints of warm gruel, sweetened with honey or treacle, (molasses.) On recovery of the beast, accustom it to the air by degrees, and notwithstanding having been nursed in the house, it will again become equally hardy as before."

INFLAMMATION OF THE STOMACH.

The complicated structure of this organ, in ruminating animals, renders it peculiarly liable to disease ; inflammation, however, does not appear to occur frequently as a primary disorder, but is more commonly a consequence of some offensive matter lodged in one of the four stomachs, or from the animal's feeding so greedily, as to weaken the organ, and prevent its performing its functions. In either of these cases, the principal object is to get rid of the offensive matter, by invigorating the weakened stomach, and enabling in to expel the matter by which it is oppressed. Should inflammation attack the stomach, independently of this cause, that is, without any hurtful matter having been swallowed, or any improper accumulation of food, the principal remedies would be plentiful bleeding and abstinence from food.

Dr. Peck says that the symptoms of this disorder are violent pain in the stomach; large blisters rise sometimes on the inside of the mouth; the animal is very restless, and appears to have the pain increased by every thing that is swallowed, which frequently brings a cough; the body feels clammy with sweat; difficulty of breathing. He attributes the cause to over loading the stomach; cold water; acid matter, or poisonous substances; not sufficient water in dry summers. The treatment recommended by this author is to bleed freely every day, if necessary; keep the body open with castor oil, &c., afterwards give febrifuges (such as glauber salt, nitre, salt of tartar, spirits of nitrous ether) as in other cases of inflammation. When the animal is recovering, give it food sparingly, a little warm, such as scalding malt, warm water, &c.

INFLAMMATION OF THE BOWELS.

The principal symptom of this disease is a griping pain, which causes the animal to lie down frequently, and rise with difficulty.—He frequently turns his head towards his belly, and endeavors to strike it with his hind foot; the body is full; the eyes dull; the pulse strong and quick. The quickness of the pulse forms a distinction between this complaint and the gripes, in which latter disorder, the pulse is sometimes hard, but seldom quickened. When the pain is violent, a copious perspiration takes place. When proper remedies are not employed, the disease terminates in mortification and death. In the treatment of this complaint, the circumstances of the case must be carefully attended to. If the pulse is much quicker than natural, the under surface of the eyelid unusually red, and the breathing disturbed, let a large quantity of blood immediately be taken away, even five or six quarts; and then, unless the bowels are unusually open, give the following drink:

Sulphate of magnesia (epsom salts,) 8 ozs; Castor oil, 1 pint; Gruel, 1 pint. Dissolve the salts in the gruel, and add to them the oil, for one dose.

The operation of this drink should be assisted by clysters. When all the above symptoms, however, are not observable; if the under surface of the eyelid is not redder than usual, or if it is rather pale; if the pulse is nearly in its natural state; and particularly if the animal is rather loose, or scours, the bleeding should be moderate; and if the animal be rather weak and in low condition, it had better be omitted. The following anodyne drink is to be given:

Tincture of opium, ½ oz; Spirit of nitrous ether, 2 ozs; Water 1 pint. Mix for one dose.

When the animal has been kept sometime on dry food, and is apparently costive, relief can only be obtained by some laxative drink, like that first above mentioned, and clysters. Bleeding, however, must not be omitted, particularly if the pulse is quickened, the under surface of the eyelid redder than natural, and the breathing disturbed. If the laxative prove ineffectual in removing costiveness, it should be repeated.

INFLAMMATION OF THE LIVER.

"The structure of this organ in horned cattle and sheep, is different from that of the horse; the latter has no gall bladder, but in the former there is one of considerable size. It is on this account, perhaps, that cattle are more subject to diseases of the liver than the horse. I do not believe that inflammation of the liver often occurs in so acute a form as to require bleeding largely; it is more commonly of a chronic or slow kind, causing a defective action in the organ, in consequence of which an unhealthy kind of bile is formed, which plugs up the ducts of the liver, and causes a derangement in the organs connected with it."

The symptoms of this disorder, according to Dr. Peck, are difficult breathing; swelling about the short ribs; pulse hard, full and frequent, thirst; yellowness of the eyes; costiveness, &c. Fat beasts are most subject to this complaint in hot weather, by being over heated in driving, or running about the pasture; by being exposed to severe cold, when hot. The treatment recommended by Dr. Peck, is to bleed according to the symptoms; give cathartics, (purges) clysters, febrifuges, &c. Diet, mashes made of scalded bran and malt; blister the sides of the belly, and rowel underneath.

INFLAMMATION OF THE KIDNEYS.

The following are the symptoms of this disorder: quick pulse, loss of appetite, the animal is frequently endeavoring to stale, and voids only a small quantity with much difficulty and pain; pressure on the loins gives pain, and causes the animal to shrink or give way to it; there is generally considerable stiffness in the hind parts, observable when the animal attempts to walk; the urine is commonly of a dark red color. This disease is, however, very different, from that named red water, (to be treated of hereafter,) and unless properly treated at its commencement, often terminates fatally. Dr. Peck says, the symptoms that are of a favorable nature, are, urine high, or a coffee color, discharged in large quantities; afterwards copious, thick, and mixed with mucus. The unfavorable are, sudden cessation of pain; urine dribbling away in small quantities, of a black and fœtid color and smell. This disorder is caused by violent blows across the loins, small stones or gravel being lodged within the kidneys; violent motion or hard driving in hot and sultry weather.

Let the animal be bled freely and take a pint of castor oil. If the dung is at all hard, or deficient in quantity, let clysters, or warm water, with a little sweet oil, be employed. The liniment, or embrocation, directed for inflammation of the lungs, should be rubbed on the loins; after which, let them be well clothed, or covered with a fresh sheep or lamb's skin.

When the pain and difficulty, or rather the almost constant straining to stale continues, after the castor oil has operated, and the bowels have been sufficiently opened, an anodyne clyster may be administered, consisting of about one ounce and an half of tincture of opium, in one quart of gruel; or, from one drachm to two of crude opium, dissolved in warm water, and mixed with gruel.

If the animal is very thirsty, he should be restrained from drinking; and what he takes should be impregnated with some mucilaginous substance; an infusion of linseed, or decoction of marsh mallows is very proper.

INFLAMMATION OF THE BRAIN.

This disease is a kind of madness, attended with ravings and constant watchings; slow respiration: a strong pulsation in the temporal arteries, and sometimes irregular; running at the nose; the animal appears in a very fierce state, as if seized with a turbulent kind of madness; the eyes appear much inflamed and ready to start from their orbits; the beast falls down of a sudden, and rises again with the same volatility, until nature is quite exhausted; a constant trembling and starting of the tendons; a dry and harsh skin; a suppression of the urine; grinding of the teeth and a total want of rest; these last are unfavorable symptoms.

The cause of this disorder is found in too great an efflux of blood pressing on the temporal arteries; from which an increased action takes place; wounds or contusions on the head; suppressions of the natural evacuations.

The cure should be sought by bleeding freely, according to the violence of the symptoms and the strength of the animal, in the jugular vein; keep the bowels open with castor oil, and other purging medicines. Blister the side of the neck with flies and spirits of turpentine.

From what has been said of the treatment of diseases, caused by inflammation of the internal organs of the body, it will be seen that they are all of a dangeaous nature, and require the earliest attention; that they are generally the consequence of improper management or neglect, and may, therefore, most commonly be prevented; and that the most essential remedy is *early* and copious bleeding, with laxative medicine.

FOG SICKNESS, HOVEN, OR BLOWN.

"We come now to treat of a class of diseases still more important, with respect to horned cattle, than the foregoing; that is, obstruction, or imperfect action, in the organs subvervient to digestion. Under this head will be brought *Fog Sickness, Hoven, or Blown; Gripes, or Flatulent Cholic; Indigestion, loss of the Cud; and Jaundice, or Yellows.* These diseases, however, will be better understood, if we give, in the first place, a short discription of the cow's stomach. All animals, which ruminate, have more than one stomach: in the cow there are four; the first is considerably larger than the rest, lies on the left side, and is commonly called the paunch. The food, having been sufficiently macerated in this stomach, is forced up gradually into the mouth, where it undergoes a complete mastication, which is termed chewing the cud. The food is then again swallowed, and conveyed to the second stomach, for the gullet opens indifferently into both. It ends exactly where the two stomachs meet; and there is a smooth gutter, with rising edges, which leads into the second stomach, and thence to the third and fourth: the animal, however, has power to direct it into which it will. The second stomach is named bonnet, or king's hood. Its internal surface consists of cells, resembling a honey-comb; where the food undergoes a farther maceration, and is then conveyed to the third stomach, called manyplies; because its internal surface rises up into many folds. Some of those folds are longer than others, and on their surface small glands may be seen, something like millet seed. From this it passes into the fourth or red stomach, commonly called the caul. This much resembles the human stomach, or that of the dog; only the inner folds are longer and looser.

Here the food is perfectly digested, and prepared for the nourishment of the animal. When cows or sheep are turned into a fresh pasture, of a different kind from that they have been accustomed to, they sometimes eat so greedily, that the stomach is incapable of contracting, or forcing back its contents into the mouth. When this happens, the food undergoes a kind of fermentation, in consequence of which a great deal of air is generated, and the paunch so excessively extended, that, if the animal is not relieved, it will either burst or destroy him by suffocation. An instrument has been invented by Mr. Eager, for giving vent to the confined air, which is very simple and appears to have answered the purpose completely. It consists of a cane six feet in length, with a round knob of wood, perfectly secured at one end. An assistant is to lay hold of the cow's horn with one hand, and the part which divides the nostrils with the other. The operator is to take the tongue in his left hand, and with his right he is to force the instrument down the gullet. As soon as it enters the paunch a great deal of air will rush out. The instrument may remain in the stomach, without injuring the animal, until the air is perfectly evacuated.

"It sometimes happens that the distention of the paunch takes place so suddenly, and in so dangerous a degree, that no time is allowed for using the instrument; in this case a sharp pointed penknife may be plunged into the paunch through the skin, by which the confined air will immediately escape.

There is no difficulty or danger in the operation; nor is any other instrument required than a sharp pointed pen-knife. Should the opening be plugged up with the contents of the paunch, they may be removed, or the orifice kept open with a probe or feather. When all the air has escaped, let the wound be closed with any kind of sticking plaster, or pitch. This opening is to be made on the left side, between the haunch bone and the last rib."

Clayter, an English writer on Farriery, directs the last mentioned operation to be performed in the following manner.

"Take a sharp pen-knife and gently introduce it into the paunch between the haunch bone and the last rib on the left side. This will instantly give vent to a large quantity of fœtid air; a small tube (which may be of elder, sumach, or a turkey, or goose quill,) of a sufficient length may then be introduced into the wound, and remain there until the air is sufficiently evacuated; afterwards take out the tube, and lay a pitch plaster over the orifice. Wounds of this kind are seldom attended with danger; when it has arisen, it has been occasioned by the injudicious operator introducing his knife into the wrong part. After the wind is expelled, and the body has been reduced to its natural state, let a cordial drench be given.

The 33d vol. of Mr. Young's *Annals of Agriculture*, gives the following recipe as a specific for this disease, even in the most desperate cases; effecting a cure within the short space of half an hour. Take three quarters of a pint of olive oil, and one pint of melted butter or hog's lard; give this mixture by means of a horn or bottle; and if it does not produce a favorable change in a quarter of an hour, repeat the same quantity and walk the animal gently about. For sheep attacked with this malady, the dose is from a wine glass and a half, to two glasses.

The following simple remedy we have been told is effectual, but cannot say to what extent it may be relied on. Make about a pint of ley, either with hot embers thrown into a sufficient quantity of water, or by dissolving therein about an ounce of pot or pearl ash, and turn it down the throat of the ox or cow affected. A proportionably less quantity is said to answer for a sheep. This medicine, we are informed, operates by neutralizing and absorbing the carbonic acid gas in the stomach of the creature, which causes the swelling and other symptoms to subside.

When the animal has obtained relief by the means mentioned, one of the following drinks is, by Dr. White, recommended to be given.

No. 1.—Powdered ginger, ½ oz.; Spirit of nitrous ether, 2 ozs.; Oil of peppermint, 30 drops; Warm water, 1 pint. Mix for one dose.

No. 2.—Powdered caraway, 1 oz.; Ginger, 1 drachm; Warm ale, or warm water, 1 pint. Mix.

No. 3.—Powdered gentian, 1 oz.; Oascarilla bark, 2 drs.; Warm ale, or water, 1 pint. Mix.

An infusion of camomile flowers and ginger is also a good stomachic in such cases.

When cattle have suffered a severe attack of this disease, the stomach is generally weakened by it; great care, therefore, is necessary in order to prevent a return. For several days after, they should be fed rather sparingly, or not be allowed to eat much at one time; and every morning and evening, for three or four days, may take one of the above drenches.

Sheep are liable to a similar disease, and may be relieved by the same remedies. The instrument, however, employed for sheep, need not be more than three feet in length: it should also be smaller and more flexible. It has been said that a common cart whip, may on emergencies, be made to answer the purpose, if used with dexterity.

Any one, unaccustomed to handle cattle, would find some difficulty in using Mr. Eager's instrument; but if the horn be held firmly with the left hand, and the part which divides the nostrils be grasped firmly with the right hand, the animal will generally submit quietly to the operator.

GRIPES, OR FLATULENT CHOLIC.

This disease, in horned cattle, is generally the effect of costiveness, or a retention of food in the third stomach.

Sometimes, however, it happens, when the bowels are in a lax, or natural state. Cows that are fed upon grains are very liable to this complaint; such, also, as are kept upon dry food are often attacked by it. When cholic takes place, independent of costiveness, it is generally occasioned by feeding greedily upon fresh succulent grass, or by drinking cold water when heated by exercise, and comes on rather suddenly; but when it is caused by costiveness, the attack is generally more gradual.

The symptoms are at first, an appearance of restlessness in the animal, often lying down, groaning, or striking against the belly with the hind feet or horns. The body is often swollen, which is most observable on the left side. The pulse is generally in its natural state. If proper remedies are not administered, the pain becomes more violent, and at length inflammation takes place, which is indicated by the pulse becoming very quick, and the ears, horns and feet cold; when this happens the disorder most commonly terminates in death. When the cholic appears to arise from costiveness, purging medicines are of course the essential remedy; but they should be combined with aromatics, or stimulants, as in the following prescription; and if the animal is in good condition, or the inner surface of the eyelid is unusually red, it should be bled freely; but if the complaint is attended with looseness, or the bowels are in their natural lax state, particularly if the animal appears rather weak, and the inner surface of the eyelid pale, the following carminative drink should be given, and no blood taken away. When the purging drink is found necessary its operation may be promoted by clysters. It may not be unnecessary to observe that when the cholic is caused by feeding greedily on grains, or any other kind of food, the cow must be fed cautiously for several days after, and take the stomachic drink, hereafter mentioned, once or twice a day, in order to restore the tone or energy of the stomach. On the other hand, should the disease have been occasioned by costiveness, or feeding upon dry food, the state of the bowels must be attended to after the animal has been relieved by the operation of the purgative drink; as the tendency to costiveness will probably continue, unless it be removed by a change of food. When this cannot be done, some salt should be mixed with the food if the animal will eat it; if not he should be drenched with three or four ounces of salt dissolved in water daily; this will serve to open his bowels in a slight degree, and increase his appetite for water, with which he should be freely supplied.

PURGING DRINK.

Barbadoes aloes, ½ oz.; Carbonate of potash, or common potash, 3 drs.; Powdered ginger, ½ oz.; Water, 1 pint; Oil of turpentine, 1 oz.; Linseed oil, 8 ozs. Mix for one dose.

When the above medicine cannot be procured in time, the following may be substituted for it.

Common salt, ½ pound; Sweet oil, or any kind of oil which is not very rancid, or even melted hog's lard, ½ lb.; Flower of mustard, 1 oz.; Water, 1 quart.—A glass of spirit may be added.

STOMACHIC DRINK.

Powdered ginger, ½ oz,; Powdered gentian, 1 oz.; Carbonate of ammonia (volatile salts) two drachms; Infusion of camomile flowers, 1 pint. Mix for one dose.

CARMINATIVE DRINK.

Oil of turpentine, 1 ounce; Tincture of opium, 6 drachms; Spirits of nitrous ether, 2 ounce Water, 1 pint. Mix for one dose.

INDIGESTION, OR LOSS OF THE CUD.

Mr. Lawrence says that in this disease, "the beast mourns, and, has no appetite, or drops its food without attempting to swallow it. Probably from defective irritability in the fibres, or contracting muscles of the *rumen* or cud-bag, the animal is unable to throw up or ruminate, of course the bag remains loaded and obstructed. The intention is to remove the obstruction and re-invigorate the animal fibres. Let the animal fast some time, then give a warm bran or pollard mash, with good hay and warm water with salt. This treatment alone may succeed with patience, even should the maw be obstructed by acorns or crab-apples. An aloes tincture made with brandy and ginger or capsicum (red pepper) might be of use in this case. After conquering the obstruction, bitter infusions made of camomile, hoarhound, oak bark, &c., in beer, may be required, as restoratives, although perhaps good dry nourishing feed will have an equally good effect.

It is remarked by Mr. White that "the earlier stages of this complaint are not marked by very striking symptoms. The animal has a dull, or languid appearance; and generally, a rough unhealthy coat and tight skin. The appetite is diminished, and at length he ceases to chew the cud. The eyes and mouth have generally a yellow appearance.

"To cure this disease, it should be attacked at an early period; for when the liver has become affected in a considerable degree, it terminates fatally. Should there be any appearance of costiveness, the following warm laxative is first to be given; more commonly, however, the bowels are in a loose state, and the dung has an unhealthy appearance; in this case, let the tonic drench be given morning and evening, and let the animal be kept in a warm sheltered situation. It may be necessary to repeat, that this, like most other internal diseases of cattle, may generally be removed by timely attention; but in attempting a cure after they have existed some time, a great deal of unnecessary expense is often incurred.

Warm Laxative.—Barbadoes aloes, 1 oz; Castile soap, 6 drachms; Ginger, 3 drachms; Cascarilla bark, 2 drachms; Warm water, 1 pint. Mix.

After the operation of the laxative, the tonic drench may be given, should it be found necessary.

Tonic Drench.—Cascarilla bark and ginger, of each, 2 drachms; Soda, 2 drachms. To be given in a pint of ale, beer, or warm water.

JAUNDICE, OR YELLOWS.

This disease may be known, principally, by yellowness of the eyes and mouth; a dull or languid appearance; and debility; a loss of appetite too is a common symptom. It may be distinguished from the former disease by the costiveness, which uniformly attends it, and by the animal appearing to be in more pain. At the commencement of the disorder a cure may generally be accomplished, by giving the warm laxative, directed for the foregoing complaint, and repeating it after an interval of five or six days, giving, in the intermediate time, the following drink, every morning and evening.

Castile soap, ½ ounce; Vence turpentine, ½ ounce; Ginger, 3 drs.; Powdered gentian root, 1 ounce. Rub the soap and turpentine together, in a mortar, until they are incorporated; then add, gradually, a pint of water, and afterward the ginger and gentian.

In the more advanced stage of this disorder, the liver is generally so injured as to render a cure impossible.

Mr. Lawrence observes that "this disease in cattle originates in hepatic, or liver obstruction from cold; however, always from obstruction, which is most effectually opened by mild mercurial purges, notwithstanding the beast may appear weak and hide bound. The yellow tinge in the eyes and mouth, and upon the urine, sufficiently indicate the disease. Take the patient to the house, the earlier the better, and if he remain weak after two or three days, give stale beer, milk warm, a pint twice a day for a week, and good keep. One gallon good beer, three or four ounces iron filings, infuse in a stone bottle corked up three or four days; shake daily. Hard labor during great heats was said by the old writers to produce Gall or Overflow of the Gall, which often terminates in the yellows."

DIARRHŒA, LOOSENESS, SLIMY FLUX, OR SCOURING ROT.

This disorder consists in a frequent discharge of dung, of an unusual color, thin and slimy. The animal gradually looses flesh, but continues for some time to feed well and ruminate. At length the excrements become of a darker color, and frothy, and in the latter stages have the appearance of half-chewed food, the digestive power being entirely lost. It is said that when animals have been long affected with this disease, they feel a great degree of pain and distress when grasped on each side of the backbone, just below the shoulders; and this is sometimes considered, by dealers in cattle, as a mark of a beast's being tainted with the scouring rot.

The fatal symptoms are the dew-lap hanging down and having a flabby appearance; the dung running off, with a putrid and offensive smell, and as it falls to the ground, rising up in bubbles; the hair all over the body appearing pin-feathered, or erect, as if the animal was enduring a severe cold.

The causes of this complaint are exposure to cold and rain, particularly when the animal has been over driven or heated by working immediately before such exposure. Drinking plentifully of water, under similar circumstances, will also produce this disease. Want of nourishment, particularly in cows that are constantly milked, often causes this disease. Perspiration suppressed by any cause; putrescency of the aliments may also bring on this complaint. It often attacks cattle which have been kept short during the winter, and when they are put to grass in the spring, they are seized with a diarrhœa, particularly if the weather is wet or cold, and grass plentiful.

Mr. Lawrence says, "if, on the first appearance of the scouring, cattle are taken in, and kept on dry food, it will generally supersede the use of medicine. "This," says Mr. White, is certainly necessary; but is not, I believe, sufficient to eradicate the disease; and though it may suppress it for a time, yet the scouring generally returns, when the animal is again sent into the pasture. The *immediate* cause of the disorder appears most frequently to be an unhealthy action of the liver which seems to form bile of an acrid or hurtful quality, by which the bowels are constantly irritated. I would advise, therefore, in the early stages of the complaint, to give the following drink for three successive mornings, which will rather increase the scouring at first; and, when the effect of the medicine has ceased, let the astringent drink be given every morning and evening."

First Drink for Scouring.—Epsom salts, 1 pound; Nitre, 2 ounces; Camphor, ½ oz. Coriander seed, 2 ounces. Mix for a dose.

This dose should be repeated for three mornings following, unless it causes sickness or griping, or increase the scouring in a considerable degree. On the fourth morning, begin with the astringent drink, or earlier, should the above medicine produce its effect before the three doses have been taken. During the time the cow is taking the former medicine, she should be supplied with warm fluids, of which thin gruel is the best, and must not be exposed to a cold air.

Astringent Drink.—Take of starch, 4 ozs.; Mix in the usual way, that is, as it is employed for stiffening clothes, with three pints or two quarts of water, so as to make a thick mucilaginous fluid; to this add, Tincture of opium, 2 drachms; Ginger 3 drachms; Catechu, or terra topponica, ½ ounce. Mix.

Or the first drink for scouring may be:

Common salt, 8 ounces; Flour of mustard, 2 ounces; Water, 1½ ounces; Oil, or melted lard ½ pound. Mix.

This will increase the discharge for a short time; afterwards the dung will gradually become of a more natural consistence. But should the scouring continue, give the astringent drink already prescribed, or the following:

Powdered catechu, 6 drachms; Tincture of opium, ½ ounce; Powdered ginger, 2 or 3 drachms; Warm ale, beer, or water, 1½ pint. Mix.

The powder or tincture of galls, would also be found a powerful astringent.

With respect to the scouring, or diarrhœa in calves, which is not an unfrequent complaint, a different treatment is to be pursued. They may generally be cured by the following drink, given morning and evening:

Take of the above starch mixture, 1 pint; Powdered chalk, or what is called prepared chalk, 3 drachms; Powdered ginger, 1 drachm; Tincture of opium, 1 drachm. Mix.

Lambs are subject to a similar disease, and may be cured by the same means, only lessening the dose.

In the diarrhœa, which arises from exhausting a cow by constant milking, when she is not sufficiently fed, or is supplied with food of a bad quality, the remedy is sufficiently obvious. But, in this case, it too often happens, that the constitution is worn out, before it is thought necessary to alter the poor animal's condition. Whenever this change is made it must not be done too hastily, as other diseases might thereby be produced.

When the scouring has ceased, the cow should be brought back to her usual state gradually. At first she should be turned out for a few hours in some dry pasture, when the weather is favorable; and her drink should be given less warm. This precaution is highly necessary, as the affected parts do not immediately recover their strength after the scouring has ceased.

The Complete Grazier directs that the beast taken with this disease should be immediately housed and put to dry food, which treatment, in the earlier stages of the disorder, will, generally, effect a cure.—Should this, however, fail, it is advised, in that work, to boil a pound of mutton suet in three quarts of milk, till the former is dissolved, and give it to the beast in a lukewarm state; or, in obstinate cases, to boil half a pound of powdered chalk in two quarts of water, till it is reduced to three pints; add four ounces of hartshorn shavings and of cassia, and stir the whole together. When cold add a pint of lime water and two drachms of the tincture of opium; keep the whole in a corked bottle, and, after shaking it before using, give one or two hornsful, two or three times a day, as the nature of the case may require.

RED WATER, OR BLOODY URINE.

In this disorder the urine appears as if it were mixed with blood. As the disease advances, the urine becomes of a darker color, and at length resembles foul coffee; the animal loses strength rapidly, and sinks under the disorder. Cattle attacked by this disease seldom live beyond the tenth or twelfth day, unless it is put a stop to by proper remedies. It is generally attended with costiveness; and if this is not the case at first, it almost always happens in the course of the disorder, unless prevented by laxative medicine. It is caused by weak relaxed vessels; thin blood; cold; change from a poor to a a rich pasture; scarcity of water in a long and dry summer; blows across the loins; some animals appear to have the disease hereditary.

Dr. White recommends, in the first place, the following mild laxative:

Epsom salts (sulphate of magnesia) or common salt, 4 to 6 ounces; Nitre, 1 ounce; Whey or thin gruel, 1 pint; Oil, or melted lard (but castor oil is preferable,) 6 to 8 ounces. Mix.

After the laxative, should the disease continue, the following drink may be given:

Alum, 1 ounce; Dissolve it in a pint of hot water, and add—Oil of turpentine, 2 ounces; Powdered catechu, or terra japonica, 1 ounce. Mix.

When red or bloody water is caused by strains or a bruise in the loins, it is distinguishable by the tenderness of the part, the animal giving way when it is pressed upon, and by stiffness in the motion of the hind parts. In this case, also, a laxative may be given; and, if the injury is considerable, the loins should be fomented with hot vinegar, and afterwards covered with a fresh sheep's skin.

Whenever the animal is observed to be frequently endeavoring to stale, voiding only a small quantity with much pain and difficulty, turpentine, and all other diuretics, are improper; and a decoction of marsh mallows is most likely to afford relief.

The Farmer's Assistant asserts that this disorder has been very rarely known in this country.

THE FOUL IN THE FOOT.

There are so many sorts of Fouls, very different from each other, that I cannot give you proper directions for their treatment unless I mention them separately. I shall therefore explain the five different sorts that are most common.

The Blood Foul. This comes on very suddenly, and generally happens to a beast that is fast feeding, or to one that is full of flesh. One day it appears well, and the next has a foot much swelled, and is very lame indeed: its claws are thrown a distance from each other; the foot is very hot, and the beast is constantly shifting it. This disorder is often mistaken, and improper drugs applied, such as verdigris and vitriol, and others that are of a heating, drying nature, which is like heaping fuel on the fire to put it out.

When you find a beast afflicted with this sort of Foul, lay a poultice of turnips and a little oil, or hogs' lard, on for the first three days: if you cannot get turnips, use rye-meal, or linseed-meal. On the fourth day make an ointment as follows:

4 oz. of Soft Soap.—1 oz. of Potash.

Beat these well together, and lay them on a pledget of tow; put it quite through, between the claws; bind it on with a cloth made for the purpose with two holes in it to let the claws through: fasten it on above with a string, or sew it on, that it may stay in its place: let it be on two days, and then take it off and examine the foot well, to see whether there be any discharge of matter, for in six or seven days it will break, and in eight or nine days a bur or coak will come out from between the claws: then lay on a little more soft soap and potash, till you get a clear bottom; and then apply green salve to heal it. Make green salve to keep for use as follows:

4. oz. of Common Turpentine.—2 oz. of Beeswax.—2 do. Rosin.—2 do. Honey.—1 do. Verdigris.—12 do. Hogs' Lard.

Powder the verdigris fine, melt all the other articles together, and put the verdigris in when they are nearly cold, stirring them well, that it may not go to the bottom. This is a good salve for any wound, and should always be kept in readiness. If there are any pipes, or proud flesh, on the sore, eat them down with blue stone vitriol.

Sometimes the Blood Foul breaks out above the claws, and in that case is very troublesome, for it gets among the bones, (as a twitter does in a horse,) and keeps breaking and discharging matter by pipes: as one heals another breaks out; and sometimes two or three places discharge at once. When the pipes throw out white matter, eat them out with a little corrosive sublimate about the size of a pea, and wash with the following:

1 pint of Vinegar.—½ oz. of Verdigris.—½ oz. of Vitriol.—½ oz. of Crude Sal-Ammoniac 1 oz. of Bole Armenian.—4 oz. of Honey.

Put all together, and simmer them over a slow fire for half an hour, stirring them all the time; then take the mixture off and put it into a pot for use. This is a powerful drier, and will also cure the Stinking Foul, and the Foot-Rot in sheep, if the feet are kept dry for a short time after. So long as any pipes throw out matter, they must be eaten with corrosive sublimate or caustic; then wash with the above, and lay the green salve on to heal with.

I have known this complaint to continue twelve or fourteen weeks; and when it does well, it remains seven or eight weeks.

There are thirty-two small bones in a cow's foot; and if they are affected, you need not expect a cure very soon: but I advise you to prevent this by poulticing well and not using drying medicines at the beginning of the Foul. As this disorder is infectious, you should be careful to keep the beast from others as much as possible; for if another beast (whether full of flesh or not) tread where the lame foot has just been, it probably will catch the disorder.

The Bone Foul. This is a lameness that comes on imperceptibly. There is nothing to see but a redness between the claws where it should be white, and the foot is also a little hotter than usual. The beast grows more lame every day for eight or ten days, and then you may see a little swelling above the claws, sometimes over one claw, and sometimes over both. In this case, take

½ oz. Oil of Origanum.—1 oz. Spirits of Sal-Amoniac.—1 oz. Oil of Turpentine.—1 oz. Oil of Amber.

Put all these together into a phial, and rub well the part affected every day, to force the disorder back again. Should it come forward so as to break, you must treat it the same as the Blood Foul. This disorder is not so common as the last, and is not so catching; but it has often puzzled both keeper and doctor, and has been taken for a lameness somewhere above, till in time it proved to be in the foot.

The Frog Foul.—This is a substance that rises between the claws, about the thickness of a finger, and sometimes the skin is not broken at all. It continues for some time, and keeps the beast a little lame. When you find a substance of this kind, cut it off with a sharp knife, and lay on a pledget made of

1 oz. of Soft Soap, and 1 dram of Corrosive Sublimate.

Mix them well together, and it will serve for two dressings, at three days' distance; and it will be as much as you will want: then heal the place up with the green salve recommended for the Blood Foul. If any proud flesh rise, eat it off with blue vitriol.

I have cut the Frog Foul out with a knife, and sometimes with a red-hot iron about an inch broad, made sharp at the end: this last will take it off as well as anything, and leave the part curable in the shortest time. There is a vein which feeds the Foul, and which must be destroyed, or the substance will rise again; but be careful not to go too deep.

The Shag, or Angleberry Foul. These may properly be put together, as they are of the same nature. It mostly takes place at the heel, and spreads as big as a half-dollar, almost like a seeded wart; and sometimes it is also on the fore-side of the foot, but not so much as behind; and it is generally on the hind-feet. This disorder, as well as the Stinking Foul, is owing to the blood being in a thin, bad state, and is much like the grease in horses' heels.

Bleed pretty freely, and give a Felon drink; then touch the place with oil of vitriol every third day till better. This Foul soon disappears, but some beasts that have bad feet are troubled with it at times all their lives, especially during a long wet season in summer, or after standing in the house dirty.

Some people turn their cattle out in winter to water where there is much dirt, and I do not know a readier way to bring on this complaint. I advise all cow-keepers to mend the roads to their watering-places, when needful. It would be much better for cattle if people would use their reason, for that would inform them that *a beast must be more comfortable when standing in the house clean and dry, than when daubed up to the knees with dirt.* Sensible people would consider that a beast can *feel* as well as themselves. If they get their feet wet or dirty, they do not think it proper, to sit or stand so; and it is the same way with the beast. If I had a beast in the house in winter, I would carry it water, rather than turn it out into the dirt, if I could not mend the road to the watering-place. Some people have it not in their power to remove this evil of bad road without being at a great expense, materials being at a considerable distance; but some have them at hand, and neglect to do it; and I may justly add, it is much to their shame to see an evil and not to remedy it when they are able.

THE STINKING FOUL. This is easily cured by drying up the juice that springs up between the claws. If you use the wash that is recommended for the Blood Foul, it will cure it by three times' washing; and if you have not that ready made, two pennyworth of egyptiacum will do it; or a little verdigris mixed up with tar and butter; or a little blue stone vitriol, dissolved in water. Any of the above, well washed on, will cure the Stinking Foul.

ON THE MANAGEMENT OF COWS, WHEN THEY ARE NEAR THE TIME OF CALVING.

The diseases which most commonly occur at this time, are strangury, or difficulty in voiding urine, and costiveness; and these it may be highly necessary to attend to, as they may, if neglected, be the cause of the cow slipping her calf. When strangury is accompanied with costiveness, which is generally the case, and is often the cause of the complaints, the bowels must be opened by a laxative composed of a pound of epsom salts dissolved in a quart of gruel, a clyster should also be given, consisting of two quarts of warm water, and four ounces of linseed oil. This may be repeated two or three times in the course of two hours, if found necessary. Should the strangury continue after the bowels are emptied, give the following drink.

Take of camphor, 2 drachms; to be powdered and mixed with spirits of nitrous ether. Tincture of opium, ½ ounce; Gruel in which one ounce of nitre has been dissolved, 1 pint. Mix.

Many cows have been lost by allowing them to be too fat at the time of calving; they are then said to die of the milk fever. It is advisable, therefore, when a cow, far gone with calf, is in too good condition, to reduce her by changing the pasture, which is preferable to bleeding or physic; but if she has approached too near her time to admit of this change having any effect, then bleeding will be proper. When a cow, in high condition, appears to be ill and feverish soon after calving, let her be bled to the extent of three quarts, and take a pint of castor oil. Should the fever continue, and particularly if it appears to increase, the animal expressing great uneasiness, with a wildness in her appearance, great redness of the upper eyelid, and quick motion of the flanks, the bleeding must be repeated. Many cows have been destroyed by the stimulating medicines that are commonly recommended and given.

Dr. Skellett recommends a similar treatment of the strangury in cows, and adds "The cow should have plenty of diluting liquors, such as warm water, gruel, &c., and mashes made of bran, or pollard, with a little malt. In two or three hours after she has had the drink and clyster, it will be necessary to drive her gently about for a quarter of an hour, as it greatly assists the operation of the medicines.

To prevent this disease, the animal ought to have air and exercise daily, and such food given her as is of a laxative nature, which will be of the greatest utility in her latter months of gestation."

TO HELP A COW IN CALVING.

There is often great mischief done from the want of understanding how to help a cow in calving. I here give you the best advice that I can, and I have had very much practice in the business. In the first place, do not be too hasty in your proceedings, for sometimes a cow will have pains on her, and part with a little water, or loosening, and the pain will go off again, and sometimes the neck of the calf-bed, or what is called the yambs, will fall down, and give pain to the cow.

I have been fetched a great distance to cows many a time when they were not near calving, and did not calve till some days after; yet, before I went, some had tried much to get their hands into the calf-bed, and could not force a passage; and sometimes people have been so foolish as to endeavor to cut a way to the calf, and those people were butchers, too, and ought to have been wiser. Only give time, and the calf-bed will open of its own accord. There are two water-bladders, and sometimes three, to one calf; and when the first comes in sight, and bursts, the cow is at calving. If she cannot part with it, put your hand up to feel if all is right; and if not, endeavor to put the calf right as well as you can. If the calf is right in the cow, it will have its back to hers, and a fore-leg on each side of its head. When this is the case, there is no fear of the cow not parting with it; but even in this case she will want a little help sometimes.

In some cases one foot is right and the other wrong, but be sure to get both feet right before you offer to draw the calf. Be careful to have the back of your hand next the calf-bed, that you may not hurt it with your fingers.

If the cow pain much against you, raise her behind, to give you more room.

Sometimes the hinder parts of the calf come first, with both the hind-feet down: then let some one that is by put his left arm into the cow to find the tail, and put his fore-finger and thumb under it, and thrust the calf into the cow; then you, with your right hand, fetch the feet up, and then it will come as well as with the head first.

If the cow pains much against you, your arm will be cramped, except the calf be thrust into her by the other person, as directed.

When I first began business I was often put to it, before I got into the way of letting another person thrust the calf into the cow. If you set your back to the back of the man that helps you, and one use the right arm, and the other the left, there will be no danger. Sometimes the head is fallen back, and when you put your arm into the cow you cannot find it: it may be under the calf; in which case, turn the calf over, and then try to find it; and if you do not, raise the cow well behind, that you may be more at liberty. Lay the calf in as good a form as you can, and if the head still falls back, put a crook into the nose, made for that purpose, with the point turned in, in the form of a ring, that it may catch nothing to do mischief. Sometimes the neck of the calf is twisted, but it must be straightened before the calf be drawn.

Sometimes there are two calves, one right and the other wrong. Before you attempt to draw either of them, be careful to get hold of two feet of the same calf. There is little danger of a cow that has two calves not doing well, for they are often smaller than when there is only one. Sometimes there are three calves, and only two get out. In my time I have known this happen several times, and the third has been left in till it has caused the death of the cow. I advise every person that helps a cow to calve, to put his arm in to feel if all is right, and whether she has any more calves in her, and also if the calf-bed is in its proper place; for sometimes it is drawn back to the isin by the navel-string, which I am of opinion is the cause of the calf-bed coming down after calving. Sometimes when you have drawn the fore-part of a calf out of a cow, it will stick at the huck-bones, and you cannot get it any further. When this is the case, never stand with the calf, but cut it in two at the small of its back, and take off the fore-part and the entrails; then thrust the other into the cow again, and turn the feet first, when it will come easy.

When a cow is long in calving, the hair of the calf often gets dry: in that case, grease it well with hog's lard, or butter, and it will pass the isin-bone much easier.

When the calf is swelled, or in a dropsy, *which is the worst kind of calving*, its head is so large that the passage is too small for it, and its body so much swelled that there is neither room to draw it nor to stir it in the calf-bed. In this case the calf must be stabbed with a lancet, or sharp-pointed knife, in many places, wherever you can get the lancet in. Then give the cow as follows:

1 oz. of Tincture of Opium.—2 ozs. Spirits of Sweet Nitre.

Bed her well down, and leave her to rest. If she is pretty easy twenty-four hours after, feel if the swelling of the calf is abated; if it is, you must try to get it from her; but if not, you must repeat the above medicine, and leave her for twelve hours more. By this method I have saved several cows. As for slipping shoulders, and such things, I can give you no directions: they must be done by those who understand the business. I have had nearly to quarter a calf before I could get it from the cow; but as I told you before, never cut the neck of the calf-bed, for cows that are cut mostly die: give it time, and it will open of itself, or it may be opened with your hand.

After a cow has had a hard time in calving, there is great danger of an inflammation coming on, or of the calf-bed falling down; for she mostly strains herself much after the calf is got away. I advise the following to be given to remove the after-pains.

1 oz. of Tincture of Opium.—2 ozs. Spirits of Sweet Nitre.

And, to prevent an inflammation, give—

1 oz. of Peruvian Bark, in Powder.

This may be mixed with the last. Lay the cow as high behind as you can, to keep the calf-bed in; and if the barren swell, as it often does, rub it well with oil of swallows, or oil of elder. If she do not cleanse in due time, give—

1 oz. Spermaceti.—1 oz. Gum Myrrh, in powder.—2 ozs. Juniper Berries, in powder.—2 ozs. Bay Berries, in powder.—1 oz. Birthwort Root, in powder.—2 ozs. Aniseeds, in powder.

To be given in cold water. Much more might be said about calving, but what is here laid down includes most of the common cases.

INFLAMMATION AND SWELLING OF THE UDDER.

This disease attacks cows about the time of calving, and is sometimes so considerable as to cause an abscess to form. As soon as it is observed, let the animal be bled freely, and take a pound of epsom salts dissolved in a quart of gruel, to which a little castor or linseed oil may be added. The swollen udder should frequently be fomented with a decoction of mallows or elder. The best method of doing this, is to dip large woollen cloths in the hot decoction, and, after wringing them, let them be applied so as to cover the whole udder: this process should be continued for some time, and repeated several times a day. When, by these means, the inflammation has been removed, some degree of hard, but not painful swelling may remain; to disperse this, the following liniment may be rubbed on the part once or twice a day:

LINIMENT.—Take of linseed oil, 4½ ounces; Spirits of turpentine, 1 ounce; Liquor of ammonia, ½ ounce. Mix.

Inflammation of the udder sometimes occurs in consequence of catching cold, or a *chill*, as it is more commonly termed; in this case, the appetite is diminished, the cow stares, the breathing is quickened, and there is some degree of fever. Here bleeding is generally necessary at first, and the following warm laxative:

Common salt, 6 to 8 ounces; Oil of lard, 6 ounces; Flour of mustard, 1 once; Whey or water, 1 pint. Mix.

The animal should be taken under cover, and fed with warm mashes of bran or malt. One ounce of nitre may be put into her water morning and evening.

This inflammation is generally confined to one or two quarters of the udder, but sometimes spreads over the whole. The milk drawn from the infected quarter is of a yellowish or whey color, and contains small flakes or curds. When the inflammation is not seasonably checked, it often proceeds to suppuration. If the matter be suffered to accumulate, a large abscess will form, and the gland, or quarter, will be so disorganized as to be incapable ever after of forming milk. It is probable, however, that, when this happens, the other three quarters will have their capacity for forming milk gradually increased. Whenever matter has been formed in the udder, and can be distinctly felt, it is proper to open it in the lowest part, that the matter may flow off freely. When this has been done, the part should be kept clean, and no matter allowed to lodge in the cavity, which should be syringed with warm water. To get rid of the matter, it sometimes becomes necessary to make an opening in the teat, a little above its extremity, or the orifice. There is no occasion for cramming tents into the cavity, or daubing the udder with filthy ointments; it is quite sufficient to bathe and syringe with warm water two or three times a day, which will prevent the accumulation of matter; and if the healing process goes on languidly, a mixture of spirit and water, or a solution of white vitriol may be injected.

Cows that are near calving should be attended to with reference to their complaint; and if it is observed to be coming on, they should be bled, and milked. They should be kept in a bare pasture, or put into a cow house and be allowed but little hay, and a little of the liniment above mentioned, or some other emollient ointment made use of to soften the udder.

What by some is called the Snarled Bag, or Swelled Udder, requires no other treatment than rubbing the part with elder ointment, and as the complaint is merely temporary, from the extension of the milk vessels, and is, in fact, a proof of a good milker, it will soon yield to this application.

THE MILK FEVER, OR THE DROP.

Cows in high condition, and great milkers, are most subject to it after calving.

Symptoms.—The animal refuses food, looks dull and heavy; eyes protrude, heaving of the flanks, restlessness, and every symptom of fever.—In a few hours, or on the next day at the latest, the cow begins to stagger; is weak in the loins; palsy steals over the whole frame; and she falls, unable to rise again. From this seeming palsy of the hinder limbs, and sometimes of the whole frame, the disease is very appropriately called—Dropping after calving.

There is evidently two varieties of this disease. In the severer kind, the brain, as well as the spinal marrow, is affected.

Treatment.—The principal expectation of relief must be placed on powerful purgatives.—Take

Epsom Salts, 12 ozs.—Flour of Sulphate, 4 ozs.—Powdered Ginger 4 drachms.—Spirit of Nitrous Ether, 1 oz.—To be dissolved in warm water.

One half of this draught may be repeated twice a day, until the bowels are properly opened. In the severer affection, it will be proper to add from ten to twenty drops of Croton Oil to the first draught. The action of the physic should be assisted by frequent clysters.—A blistering liniment should be rubbed on the course of the spine.—If the cow should swell, relief must be obtained by means of the flexible pipe for that purpose; but should the pipe not be at hand, an opening may be made into the paunch at the flank, with a sharp pointed knife, in the usual manner.

An attempt should be made two or three times a day to bring back the milk, by diligently stroking the teats.

CALVES; THEIR DISEASES.

DIARRHŒA. This disease is common with young calves; at the time of weaning, especially. Weaning and change of food should not be too sudden.

New milk should be used with skim-milk or gruel, whichever is to be substituted for the mother's milk; and this done gradually, making the new food come naturally to the calf. If the calf have a bad looseness of the bowels, it should be attended to *at once.* Give two ounces of castor oil; or four of epsom salts. Then give—

Prepared chalk, 2 drs.—Powdered opium, 10 grs.—Do. ginger, ½ dr. Ess. of peppermint 5 drops.

In half a pint of gruel, twice a day. The above is a dose for a calf under two months old.

An old New-England farmer gives the following recipe:

"Put into a suitable bottle about half a pint of good cider. Then open a vein in the neck of the calf, and let into the bottle about the same quantity of blood. Shake it well together, and before it has time to thicken, put it down the calf's throat, which is easily done with the bottle. In thirty years use of it, I have never known it to fail in effecting a cure, by once giving it, except in one instance, and then a second dose proved effectual."

COSTIVENESS. When it occurs in calves but a few days old, the cure will be almost impossible. Epsom salts, dissolved in warm water, are recommended. The first dose may consist of two ounces of salts, in two or three quarts of water; to be continued in ounce doses every six hours, in same quantity of water. If the calf is two or three months old, the first dose should be a quarter of a pound of salts in a gallon of warm water. *Costivensss is exceedingly difficult of cure;* and the farmer should be very careful to *prevent* it.—Whenever the dung is perceived to be a little too hard, a mild purge should be given.

THE HOOSE. This is a bad disease in calves, speedily resulting in death. As soon as the calf is observed to cough considerably, he should be put into a dry, warm stable. A light bleeding, and a small dose of physic will now be good, and probably cure the patient.—Sometimes this disease is prevalent in certain neighborhoods, and carries off many calves.

Should the animal get rapidly worse, and his cough be very distressing, the following will be a good medicine, if the calf be six or eight months old:

Oil of Turpentine, 1 oz.—Linseed Oil, 3 ozs.—Powd'd Ginger, 1 dr.—To be taken once a week.

Some people use half a pint of lime-water every morning, followed by a table-spoonful of salt, the same afternoon. This is considered a good remedy, and is easily procured.

Canker. This is known by soreness of the mouth, which prevents the animal from eating as much as usual. Little pimples are seen about the gums, and the animal grows poor. Sometimes the tongue and gums are swollen, and the calf is feverish.

Give at once one or two ounces of epsom salts, daily, until it is better; washing the mouth in a solution of common alum, say half an ounce of alum to a pint of water.

To Prevent Calves from Sucking. Most persons are aware that some calves, when they wish to have them weaned, are disposed to continue the habit of sucking, and in this way give much trouble. To prevent this, take strong old cheese, of which make a paste, and apply the same to the cow's teats.

Scours in Calves. When the calf is attacked, it should be put in a warm, dry stable, and not be permitted to suck more than half the quantity of milk it is wont to do; but should be put to the cow regularly three times a day. Make a tea of equal portions of white-oak, beech, dogwood, and slippery-elm bark; and give small doses twice a day, and the calf will soon recover.

TO DRY THE COW OF HER MILK.

It is often necessary to dry up the milk when the cows are wanted speedily to fatten.

The best time to dry the cow is early in the spring, when they are feeding on dry fodder. A good dose of physic, followed by mild astringent drinks, will usually settle the business, especially if she is moderately bled before the physic is given. Alum in the form of whey, or dissolved in water, will be the most effectual; as well as the safest astringent. Six drachms will be the medium dose. The cow may be milked clean when the astringent is given, and then turned on some dry upland pasture.

TAIL EVIL, OR WOLF IN THE TAIL.

This is a distemper attended with weakness and sluggishness to which horned cattle are liable in the spring. The end of the tail becomes hollow, and relaxed, but not, as some have asserted, destitute of feeling.

Treatment.—A cure is easily affected by cutting off a small piece of the tail, which will be attended with a discharge of some blood. But when the tail is but little affected, and near to the end, a slit of an inch or an inch and a half, in the end of the tail, is preferable to amputation.

BLAIN, &c.

This disease is sometimes known by the name of Blain, Hawkes, or Gargyse.

Symptoms.—In this disease, there are generally blisters under the tongue, or at the back part of the mouth; the pulse is quicker than natural; there is more or less heaving of the flanks; and the bowels are sometimes costive. If the disease is not soon checked, there is often a copious flow of saliva from the mouth, and there is danger of suffocation from the great and rapid enlargement of the tongue.

Treatment.—Cut deeply, and from end to end, the bladders that will be found along the side of, and under the tongue. They will appear to be filled with a glutinous matter, and, although there may not be much bleeding from them at first, considerable bloody fluid will gradually ooze out, the swelling of the mouth and head will subside, and the beast will be very much relieved.—If, however, much fever has accompanied the enlargement of the tongue, it will be prudent to take away five or six quarts of blood, and give physic.

MANGE.

This is a cutaneous disease, which is very contagious, for so many cows as come in contact with one laboring under the disorder, will be sure to catch it. Its symptoms are, a scurf on the external part of the body, which is always attended with an itching. This the animal shows, by having a continual inclination to rub the affected part or parts against any thing she can get at. Some say that it is caused by a kind of animalculæ, which burrows in the skin. It generally attacks those animals which are low in flesh, and have been fed on poor forage.

The first step in order to cure this disease, is to take a currycomb and gently curry off the scurf, in order that the medicine may have the better effect. After this the following application is to be rubbed on the parts affected, which may be repeated every three or four days till a cure is effected; and it seldom requires more than two or three applications:

Flower of Sulphur, 1 pound; Spirits of Turpentine, ½ pint;—Train Oil, enough to make it into a thin liquid.

WOUNDS.

Cattle, in general, are subject to a variety of accidents, but we will only direct attention to the most important remedies for punctures, bruises, or common wounds.

Treatment.—In case of common flesh wounds, nothing more is necessary than to apply a salve, consisting of white lead and oil of turpentine, together with a little brandy, to the lips of the cut, which should be drawn together as closely as possible, and carefully to exclude the air.—But if the laceration be deep, it must be washed with warm milk and water: after which the wound may be filled with lint or tow, dipped in a digestive ointment, composed of Venice Turpentine and Balsam of Copaiva, of each one ounce, with two ounces of yellow Basilicon.—The wound must, as in the former case, be kept from the air and dirt, or its healing will be materially retarded.

SPRAINS, OR STRAINS.

In recent Sprains, attended with lameness and heat, use the following:—Take

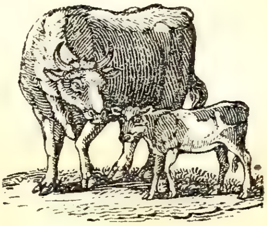
Bay Salt, 4 ozs.; Oil of Origanum, 1 drachm.

Rub them well together, until the salt is reduced to a powder, then add

Vinegar, ½ pint; Spirit of Wine, 2 ounces; Water, 1 quart.—Bathe frequently with this.

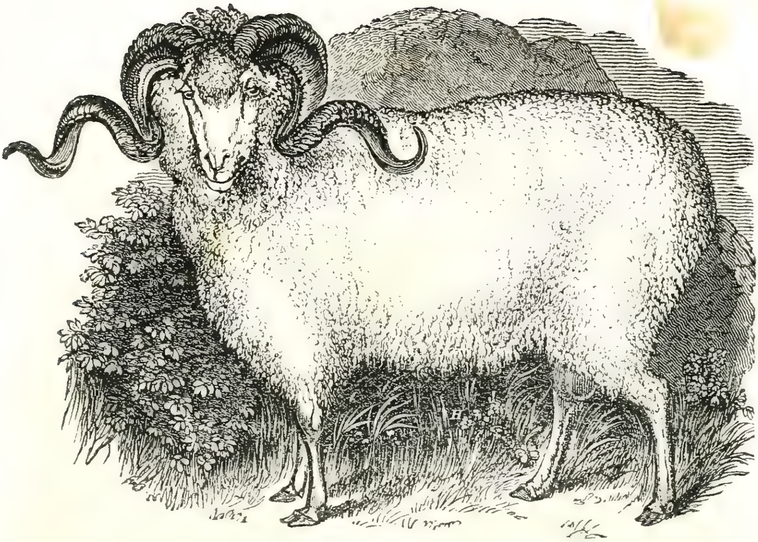
ULCERS.

When these break out, physic but don't bleed. Salts is the best physic.—Foment them with warm water, and apply equal parts of Turpentine, Hartshorn, and Camphorated Spirit.—Wash the ulcers several times a day, with a solution of the Chloride of lime;—give mashes and thick gruel.



INDEX.

Neat Cattle.—Introduction, PAGE 375
Rearing and Feeding, 385
Diseases, Accidents, &c., 392
Inflammatory Fever, 393
Murrain, or Pest, 394
Catarrh, or Cold; Epidemical Cold; Distemper, 395
Inflammation of the Stomach, 397
" " Bowels, 398
" " Kidneys, 399
" " Liver, "
" " Brain, 400
Fog Sickness, Hoven, or Blown, "
Gripes, or Flatulent Cholic, 403
Indigestion, or Loss of the Cud, 404
Jaundice, or Yellows, "
Diarrhœa, Looseness, Slimy Flux, or Scouring Rot, 405
Red Water, or Bloody Urine, 407
Foul in the Foot, 408
Management of Cows when near Calving, 410
To help a Cow in Calving, 411
Inflammation and Swelling of the Udder, 413
Milk Fever, or the Drop, 414
Calves; their Diseases, 415
To Dry the Cow of her Milk, 416
Tail Evil, or Wolf in the Tail, "
Blain, &c., "
Mange, 417
Wounds, "
Sprains, or Strains, "
Ulcers, 418



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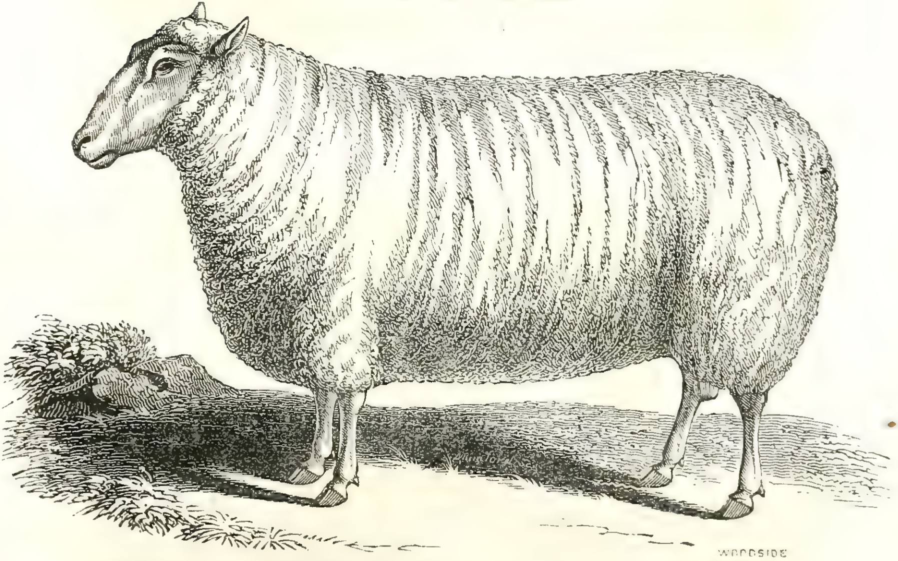
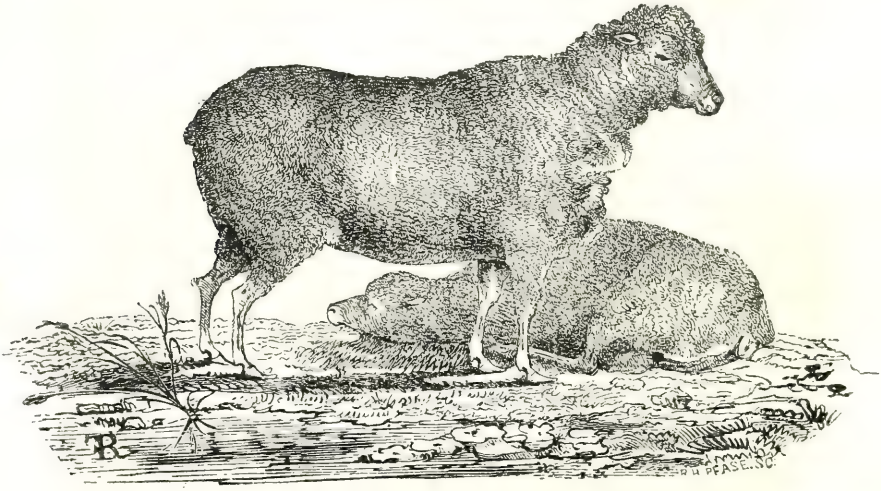


PORTRAIT OF THE LEICESTER BUCK "LAMBERT,"

THE PROPERTY OF AARON CLEMENT, ESQ. OF PHILADELPHIA.

Lambert was bred by Dr. Huddleson of Delaware county, Pa.—is 3 years old and weighed in March last, when only in good keeping condition, 250 lbs. He produced at last shearing 10½ lbs. of Wool of superior quality and length of staple. His grand sire was imported by Mr James Hickman, of Del. Co., and his dam was from the celebrated flock of the late John Barney of the State of Delaware, whose sheep were so highly celebrated for their fine mutton in the Philadelphia and Baltimore markets.

MERINOS.



THE SHEEP.

The Sheep is, perhaps, all things considered, one of the most valuable animals given to man by a beneficent Providence. No animal is of greater utility. Inhabiting almost every part of the globe from Iceland to the torrid zone, sheep not only supply food and clothing to the tens of thousands of persons who cultivate and rear them, but the wool they afford sustain in active employment large and extensive manufacturing establishments, thus contributing in large proportion to the productive labor, the commercial prosperity, and the wealth or opulence of various countries. Existing in such a diversity of climate, the varieties of their form and clothing (fleeces) is necessarily greatly varied. They are generally cultivated for their wool or flesh; in some countries—the United States for instance—for both.

Different Varieties or Breeds of Sheep.—The U. States, from its great diversity of soil, surface, and climate, possesses advantages for the successful prosecution of sheep husbandry, unsurpassed, if equalled, by any other country. Many sections of the country are undulating—the hills mostly covered with fine herbage—enclosures extensive and unequalled—many pastures furnished with running water, and sheltered more or less by trees from the summer sun, with other very great and important advantages, render the United States, highly favorable to the most prosperous culture of sheep.—The wool produced in this country—that is, the best, and which has the management throughout of competent persons, possesses every good quality, especially of fineness of texture, goodness of staple, and softness. Some attention was devoted to sheep husbandry and the improvement of wool in this country for a few years preceding the revolutionary war; at that time the finest wool was obtained in New Jersey, which, according to an account laid before Parliament, contained 143,939 sheep; a much larger number than was found in either of the other colonies. The same report which states the number of sheep, adds that specimens of wool from all the Provinces of North America having been submitted to the wool staplers and connoisseurs of the article, there was but one opinion, namely, that the texture or fineness of the wool from New Jersey, was not only superior to that from the other provinces, but much superior, in almost every point of excellence, to that raised in Great Britain. The specimen from Long Island, New York, ranked next to the Jersey.—

The reader will, however, bear in mind, that since the period here referred to, very great and astonishing improvements were made in this branch of husbandry in Great Britain, while in this country the reverse was the case, and little or no attention was paid to the improvement of the various breeds until within a few years past. The reasons for this, and the effects produced, are too well known to require further notice.

There are a great variety of breeds of sheep, all probably derived from one parent stock; each possessing some peculiar quality by which it is distinguished from all others: to describe them all, with any show of justice, would require a volume of no small dimensions.

The *South-down*, which has been reared for centuries on the chalky soils of Sussex, have obtained a high reputation in Europe, and also in America. Their general diffusion has effected a great and important change on the short-wooled breeds. The specific characters of this breed are—faces and legs gray—bones fine—head clean—neck long and small—low before—shoulder wide—light in the fore-quarter—sides and chest deep—loin broad—back-bone rather too high—thigh full and twist good—wool fine, short, and of good quality, and ranging from three and a half to four pounds per fleece at two years old. Their flesh is of excellent flavor—they are kindly feeders, and well adapted to an extensive range of the lighter soils. They are without horns.

The *new Leicester* is frequently termed the *Dishley breed*, from having been produced by Robert Bakewell, of Dishley. Their forms are handsome—color white. As a lowland sheep, and destined to live on good pasture, the new Leicester is without a rival—in fact he has improved, if he has not given the principal value to, all the other long-wooled sheep. The head should be hornless, long, small, tapering towards the muzzle, and projecting horizontally forwards. The eyes prominent, but with a quiet expression. The ears thin, rather long, and directed backwards. The neck full and broad at its base where it proceeds from the chest, but gradually tapering towards the head, and being particularly fine at the junction of the head and neck; the neck seeming to project straight from the chest, so that there is, with the slightest possible deviation, one continued horizontal line from the rump to the poll. The breast broad and full; the shoulders also broad and round, and no uneven or angular formation where the shoulders join either the neck or the back, particularly no rising of the withers, or hollow behind the situation of these bones. The arm fleshy through its whole extent, and even down to the knee. The bones of the legs small, standing wide apart, no looseness of skin about them, and comparatively bare of wool. The chest and barrel at once deep and round; the ribs forming a considerable arch from the spine, so as in some cases, and especially when the animal is in good condition, to make the apparent width of the chest even greater than the depth. The barrel ribbed well home, no irregularity of line on the back or the belly, but, on the sides, the carcass very gradually diminishing in width towards the rump. The quarters long and full, and, as with the fore-legs, the muscles extending down to the hock; the thighs also wide and full. The legs of a moderate length, the pelt also moderately thin, but soft and elastic, and covered with a good quantity of white wool, not so long as in some breeds, but considerably finer.

This account combines the main excellencies both of BAKEWELL's own breed, and CULLEY's variety or improvement of it. It is precisely the form for a sheep provided with plenty of good food and without any great distance to travel or exertion to make in gathering it.

The principal recommendation of this breed are its beauty and its fulness of form, comprising, in the same apparent dimensions, greater weight than any other sheep; an early maturity and propensity to fatten equalled by no other breed; a diminution in the proportion of offal, and the return of most money for the quantity of food consumed.

There are several varieties of sheep cultivated in the United States. The native breeds are merged almost entirely by crosses with the best foreign improved varieties which have been imported into the country. Dr. E. HOLMES, in his report to the Agricultural Society of Kennebec, enumerates eight different breeds of sheep cultivated in the United States, viz: the native breed, the Otter, the Merino, the Texel, the Dishley or New Leicester, the Caramanian, the South-Down, the Frederick, and several other varieties; but those above mentioned embrace all worthy the notice of the farmer.

The *South-downs*, the *Dishleys* or *new Leicesters*, and the *Merinoes*, are the only breeds extensively cultivated among us at this day; and as they possess every necessary quality of excellence, it would seem unnecessary to extend the variety. The latter breed, or *merino*, seems now to be most generally diffused or sought after.

The wide diffusion of the *Merino or Spanish sheep*, in all wool-growing countries has effected a complete revolution in the character of the fleece. The excellence of the merino consists in the unexampled fineness and the peculiar felting property of their wool; and in the weight of it yielded by each individual, averaging from three to five pounds, and in Spain eight pounds from the ram and five from the ewe. From the closeness of their coat, and the luxuriance of the yolk, they do not suffer much, if any, more than other breeds from the extremes of cold and wet. They are a patient, gentle, quiet animal, and will amply recompense the hand of careful culture, whether it be extended to them under a burning tropical sun or in the frozen regions of the north.

The Spanish merino breed was introduced into England in 1788, and crosses with the Ryeland, South-down, and other choice fine-wooled breeds soon ensued. GEORGE III. imported full-blooded merino rams from Spain, and cultivated them with great care; and in the year 1804 the sales of his improved flocks attracted great attention to the breed. The result of the crosses with the native breeds, did not fulfil the expectations formed; the experiments being too casually pursued, and too hastily abandoned to be decisive.

The pure Spanish merinoes were first introduced into the United

States by the indefatigable exertions of Chancellor Livingston and others of New York, and Col. Humphrey of Connecticut, in the year 1802. The importations were not, however, confined to these public spirited individuals; some others, in other parts of the country, with a laudable zeal to improve the quality and value of their flocks, followed their example. The importance of sheep husbandry was slowly but surely diffusing itself thoughout the nation, when the eyes of the people were suddenly opened by the war of 1812, which effectually checked all commerce between the inhabitants of the two belligerent powers, namely, the United States and Great Britain; and the want of cloths, cassimeres, &c. which had been supplied by England, was very seriously felt. The value of the sheep—for that which he should be valued—his fleece, was not only justly appreciated, but in the case of the merino, yielding a finer wool than others, we passed from a state of apathy to the other extreme—a complete mania seized upon the people—the most extravagant and incredible prices were paid for a single full-blooded ram,*—thousands entered into the speculation; merino wool advanced rapidly to two dollars and a quarter per pound, but suddenly fell on the restoration of commerce which immediately succeeded the declaration of peace.—Thousands were ruined—the wool-growers turned their attention to other matters, and although for the time many flocks were shamefully neglected, yet the reputation of the breed on the whole was permanently established.

Improvement of breeds.—The breed of sheep to be reared in any case must be selected according to the nature of the pastures, and the artificial means possessed of supplying food. If a mountain breed is selected for rearing on a low arable farm, then the advantage is lost which the farm possesses of producing a larger and finer class of animals. If, on the other hand, a lowland breed is carried to a mountain farm, an error of a different kind, but yet more hurtful, is committed; for a fine stock will be ruined if placed in circumstances where it cannot be maintained.

The breed, then, being selected which is the best suited to the circumstances in which it is to be placed, the province of the breeder is to breed from the best individuals.

Disposition to fatten, and early maturity, are the properties most regarded in sheep to be reared for food. But the property of yielding good and abundant wool is not to be disregarded; and there is another property essential in the rearing of this class of animals, namely, hardiness and sound health of individuals.

In the case of the sheep as of the ox, refinement in breeding may be carried too far, and with more danger. By breeding from animals near of blood, the same means exist in the case of the sheep as of the ox, of giving that prematurity of age which produces fineness of the bones, and a disposition to fatten. But it is attended, too, with the same effect, of rendering the animals more delicate, and subject to diseases. It seems a violence done to nature, when carried too far, and the animals show the effects of it by becoming too fine in their skins, by ceasing to produce wool in sufficient quantity, by the females ceasing to yield milk, and by the males becoming at length unable to continue their species.

Whenever, then, the sheep of any flock become too near of blood, the breeder should resort to the best animals of another family, but of the same breed, to continue his stock. This species of crossing is now easy, since there is scarce any of the cultivated breeds of which superior males may not be procured from other flocks. In the case of the New Leicester, so widely diffused and highly improved, no necessity can exist for breeding from animals too nearly allied.

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* Such was the intense interest excited, that sales were readily effected, varying from six to nine hundred dollars per head; and in a few instances, from fifteen hundred to two thousand dollars were paid for a single ram.

Form.—In the sheep, as in other animals, certain external characters indicate a disposition to fatten, and at an early age. Other characters indicate a disposition to produce wool, and the quantity of wool, it has been said, is not to be disregarded in the rearing of the sheep. But where the main purpose in rearing the sheep is for food, the province of the breeder is to accomplish this object with as little sacrifice as possible of the secondary qualities.

A property that indicates a tendency to fatten in the sheep as in the ox, is a general rotundity of form and fineness of the bones. The chest should be broad, the ribs well arched, and the back and loins accordingly broad, flat, and straight. The sheep, like the ox, occupies, independently of the neck and head, nearly a rectangle, and the larger the proportion of this rectangle which the body occupies, the more perfect is his form as a feeding animal. His body, therefore, should be large in proportion to his limbs, or, in other words, his limbs should be short in proportion to his body; his breast should be well forward, and his belly straight; his head should be small and his ears thin; his limbs to the joint should be fleshy, below delicate and covered with short hair: his skin should be soft and elastic; his wool soft to the touch, thick, and coming well forward to the face, but not covering it: his face and forehead should be covered thickly with short hair, and his eyes, as indicative of health, should be lively.

Rearing and feeding.—In the rearing and feeding of sheep, the system to be adopted must depend upon the nature of the farm, and the kind of stock. The treatment of mountain-sheep in an elevated country is, of necessity, very different from that of the larger sheep on an arable farm. It is the rearing and feeding of the latter which may be first considered.

The female sheep are ready to receive the ram in November, or sooner; but the precise period is determined by the forward condition and constitution of the animals. A medium period is from the 5th to the 10th of November, in which case the ewes will begin to lamb previous to the beginning of April, and the principal period of lambing be in the early part of that month.

To prepare the ewes, they should receive good feeding for a time previous to the male being introduced; and, for this purpose, they may be turned upon the stubbles where the young grass is for a fortnight before. The ram is put into the field where the ewes are pasturing, and herds along with them. He covers them as they come into season; and one ram is considered sufficient for eighty sheep. In order to show what females have received him, and what have not, it is usual to smear his breast with pigment, which appears upon the fleeces of such ewes as he has covered; and if more than one ram is with the flock, then, by smearing the rams with different colored pigment, as red and blue, the progeny of each is known. Such ewes as have not received the ram may be taken from amongst the breeding stock and fed for the butcher.

Rams are fit to propagate their species in the autumn of the second year. Well fed females will receive the male even in their first year; but the proper period is in the October of the second year.

The food of sheep is herbage, upon which they feed during summer. In winter, when the pastures fail, the feeding-stock are fed on a full allowance of roots, or other succulent food; but the ewes are suffered to pasture during the entire winter, and merely receive such an allowance of other food as is required to keep them in condition. During hard frosts and snow, they may receive hay, which may be either given to them from racks, or simply spread upon the ground They thus pasture in the fields, receiving hay when occasion requires, until within a few weeks of the period of lambing, when they should receive an allowance of turnips, or other succulent food, laid down in the fields where they are pasturing.

When the period of lambing arrives, every vigilance is necessary on the part of the shepherd. He must be at all times at hand to assist the births. He must take his necessary rest only during the day, and for the shortest time possible, when his place can be supplied.

The birth of the young must be assisted, but not precipitately. The proper position of the fœtus is with its head couched between its fore-legs. In other positions the birth is difficult, and it generally becomes necessary to turn the fœtus, which is done by elevating the ewe from behind. Experienced shepherds are acquainted with these duties.

When the young is born, it is to be immediately recognised, and licked by the dam, and assisted to the teat when necessary. When the lamb of any ewe dies, another should be supplied to her; either one of the twins of another ewe, or one that has lost its own dam. Sometimes much difficulty is experienced in getting the ewe to adopt another lamb; and cases even occur, when the ewe, from some unknown cause, deserts her own young. In proportion as the ewes have lambed, they should, if possible, be transferred with their young to a field of new grass.

An operation to be performed upon the lambs is castrating the males which are not to be reserved for rams. This may be performed in a few days after the birth, generally in eight or ten days. It is done by the shepherd, with an assistant to hold the animal, and, at the same time, it is usual to cut off a portion of the tail. The operation is performed on lots of the lambs, and not on each singly as it reaches a certain age. It is well that it be performed early, the difficulty and danger increasing with the age of the animal, and that the weather at the time be dry, and, if possible, cloudy and mild.

The lambs continue with the ewes sucking them till the period of weaning, which generally takes place by the middle of July. Weaning is simply performed by removing the young from their dams, and keeping them for a time so far asunder that they may not be disturbed by their mutual bleatings.

When the lambs are weaned, the ewes should be milked for the purpose of relieving their udders and running them dry by degrees. Three milkings will generally suffice, though, should any particular cases require more, it is the province of the shepherd to attend to them. Supposing the lambs to be weaned in the evening, the first milking may take place in the following evening, or in twenty-four hours; the next at an interval of thirty-six hours; the last at an interval of forty-eight hours. When the ewes are to be milked, they are driven into a narrow pen, the milkers, with pails, milking the ewes from behind; and on each ewe being milked, she is turned round in the pen by an assistant, the milkers continuing their work until the whole are milked.

After being weaned, the lambs receive the name of hoggets, or hogs, the rams being termed tup-hogs, the castrated males, wether-hogs, the ewes, ewe-hogs. The wether and ewe hoggets are now pastured together for the remainder of the season. When winter approaches, or rather when the pasture fails, the hoggets, male and female, are to be put on a full allowance of roots.

When the sheep are penned upon the turnips, they are confined to a given space, generally sufficient for them to consume in one week. The temporary fences used for penning them consists either of wooden hurdles, or nets, the latter being the most economical and convenient. In this space the sheep consume the turnips, and when they have eaten them close to the ground, the remaining portions of the bulbs are picked up by means of the hoe, so that the sheep may be enabled to eat them wholly up.

When they have consumed one space, the pens are shifted to another, in such a manner as to leave the ground already cleared open to the animals for walking over and resting upon. A rack should be placed in the field with hay.

Sometimes when young sheep are penned till late in the spring, they find difficulty, from their teeth becoming loosened, in eating the turnips. In this case, the turnip-slicer may be employed, and then the sheep may be brought from the turnip-field, and have the turnips laid down to them in a field of dry sward.

The young sheep or hoggets are in this manner fed on turnips till the grass is ready in spring. This will be early in April, or in the southern parts of the country, in March; for sheep do not require the same full herbage as cattle, and may therefore be turned out at an earlier period to the fields.

Should the roots fail before the pastures are ready, then the young sheep are to be carried on by substitutes, as hay, or even corn. It is rarely, however, necessary on a well-ordered farm to resort to this costly species of feeding; yet when necessary, it must be done, since this inconvenience is less than the evil of suffering the stock to lose condition.

The period of shearing sheep depends upon the forward condition of the animals. When fat, the old wool begins to come off more early than when they are less forward. Good conditioned sheep may be shorn in May, but always early in June; the precise period being denoted by the state of the wool which comes readily off when plucked, and which would fall entirely off were it not shorn.

About eight days previous to shearing, the sheep are driven to a pool, if possible in a running stream, and three or more persons are to stand in this pool. The sheep are brought forward to a pen on the bank, and lifted into the pool one by one. The first of the persons in the pool seizes the sheep by the wool, and keeping it on its back, plunges it well from side to side. He passes it on to the person next in order, and he in like manner plunges the animal in every direction. This person then passes it on to the third, who examines the fleece as well as circumstances will allow, plunging the sheep at the same time, and thus finishing the operation. The animal is thus passed through the hands of three persons, and sometimes more; but the last should be a trusty person, such as the shepherd himself, whose duty it is to see that the fleece is completely washed and freed of sand and impurities.

This description has a reference to young sheep, whose management we are now considering; but the same method is applicable to all the sheep upon the farm, young and old, with this difference, that the ewes, which are at this period suckling their young, have the lambs separated from them during the process of washing.

The sheep being washed, are driven to a clean pasture, and when the fleece is dry, which it will be in a few days, if the weather is good, the sheep may be shorn; but it is better that seven or eight days should elapse before shearing them, in which case the yolk of the wool is renewed.

When the sheep are to be shorn, they are driven to a pen or other enclosed space, and brought one by one to the shearers. The sheep to be shorn is first placed upon his rump, and the shearer, with the shears, beginning at the neck, clips in a circular direction down the belly towards the back. The animal is then laid on his side, and kept down by the leg of the shearer, who clips the fleece all round to the back. Turning the animal on the other side, he clips in like manner round to the back; then raising the sheep, he clips the part of the fleece not yet cut away, and so lets the animal go, taking care that it shall not entangle itself with the fleece. The fleece, as soon as it is shorn, is taken away by an attendant, spread out, neatly rolled up with the inner surface outmost, and then deposited in some dry place, until it is packed in the wool sheets.

When the animals are shorn, they are frequently marked with a stamp dipped in boiling tar, to distinguish the kinds and ages of the sheep. This kind of mark, though convenient, is injurious to the wool.

After the operation of clipping, the young sheep are termed shearling sheep; the castrated males, shearling wethers; the females, shearling ewes; the rams, shearling tups or rams. But it is common to apply to them at this period the following terms:—The shearling wethers are termed dinmonts; the females are termed gimmers; and the rams are still termed shearling rams; and these names the animals retain until they are shorn of their second fleece in the following year.

The shearling ewes or gimmers are, after being shorn, kept at grass for the remainder of the season, and they receive the rams in October in the manner described.

The shearling wethers or dinmonts are soon after shearing fit for the butcher. They are then about one year and three months old. If of the Leicester breed, they will weigh 16 or 18 lbs. the quarter, and their fleeces will weigh 7 lbs. each, or more.

But should the pasture be inferior, the breed bad, or the stock not in sufficient order, or should the state of the markets render it inexpedient to sell, then the dinmonts may be kept upon the farm for one winter more. In this case they are pastured precisely as when they were hoggets during the remainder of the season; and when in autumn the pastures again fail, they are penned on turnips, and treated in the same manner as in the previous winter.

The dinmonts are frequently sold fat before they have completed the entire winter's feeding. But it is more common to keep them during the winter on turnips, to put them upon good and early grass in the spring, and to dispose of them after they are shorn. They are then two years and two or three months old, and have yielded two fleeces to the breeder. They will weigh at this age from 25 to 30 lbs. the quarter, or more, and their fleeces will weigh about 8 lbs.

These and other sheep, after they are shorn of their second fleece, are termed two-shear sheep: the males not castrated are simply tups or rams; the males castrated are wethers, and the females are ewes. It is more profitable to be able to feed off sheep when shearlings than to retain them till they are two years old. The former is the perfection of feeding; but it is a perfection attainable on every arable farm in this country on which roots can be raised, and a superior breed of sheep maintained.

In the practice of the farm, then, the male sheep are disposed of either after having yielded one fleece, or after having yielded two fleeces. Such of the ewes as are reared on the farm, but are not to be employed for breeding, may be treated in the same manner.

But with respect to the ewes upon the farm kept for breeding, it is necessary, after they have borne lambs for several years, to dispose of them, and to supply their place by younger ewes reared upon the farm. A certain number of gimmers being each year added to the breeding stock, an equal number of the oldest ewes are disposed of, and thus the number of breeding sheep is maintained.

And not only are all ewes which have borne the required number of lambs to be disposed of in this manner, but all breeding sheep, of whatever age, that are not healthy, or that are of a defective form, and their place is to be supplied by the younger and better stock reared upon the ground.

These, then, have been the principal points of practice in the management of a sheep-stock reared upon the farm: The female stock, like the males, were suckled by the dams till July; they were then weaned, and pastured with the wether-hogs during the remainder of the season, when they were put together with the wether-hogs on turnips before winter; they were fed on turnips till April, when they were turned out to pasture along with the weather-hogs; early in June they were clipt; in the month of October they were joined to the rest of the ewe stock, supplying the place of the older ewes that have been disposed of; and after this time they are treated in all respects as breeding ewes, and kept upon the farm till they have borne lambs for three or four years. The males, it has been seen, were castrated a few days after birth,—were weaned in July, when they received the name of wether-hogs,—were pastured during the remainder of the season, and were then, together with the ewe-hogs, penned on turnips; in the following April they were put on grass, and by the beginning of June they were washed and clipt; they then received the name of dinmonts, when they were fat, and ready to be sold as soon afterwards as convenient: or when, from the deficiency of feeding or other cause, they were not then ready for the butcher, they were again pastured during the summer, a second time penned on turnips, and generally pastured till they were clipt the second time, when they were wethers and in high perfection with regard to growth and feeding.

Sheep, especially when fat and loaded with wool, are often unable to rise when they have fallen upon their backs in any hollow place, and they will perish if not relieved in time. To guard against these and all other accidents, sheep must be regularly tended. They must be examined at least twice in the day; they are to be cleaned when necessary, by cutting off clotted wool, and above all things they are to be guarded against the attacks of maggets. In the latter case, a decoction of tobacco mixed with spirits of tar, and in some cases a solution of sublimate of mercury, are the remedies commonly employed. Their heads are frequently injured by the attacks of flies: for which a little tar spread upon the wound is the most frequent and the best remedy.

In the whole treatment of sheep, gentleness is of great moment. The worrying and harassing of them by dogs is never to be thought of. In upland pastures the faithful dog is essential to the shepherd; in an enclosed country the necessity for employing him is greatly lessened, and he is always to be used with temperance and humanity towards the flock.

The treatment of a lowland stock has been described, where the breeder is likewise the feeder; but sometimes the object of the breeder is not to feed the stock which he rears, but, after having brought it to a certain age, to dispose of it to others who will feed it.

Sometimes, on the other hand, the design of the farmer is not to breed sheep, but to buy them from others whose interest it has been to rear and not to feed them. The effecting of these sales, on the one hand, and the making of these purchases on the other, constitute one of the branches of farming as a business. But it is a branch which cannot be taught by rule, but must be learned by practice.

One of the branches of sheep-farming, in which the breeder is likewise the feeder, is the rearing of lambs and selling them when fattened. The lambs are fattened by the milk of the mothers, and are merely disposed of when they are ready for being killed. The feeding of the lambs in the house for early consumption is also practised, and in some parts has been brought to a system. This branch of management need not be described. The sheep of the Dorest breed are valued as being the best suited to yield early lambs in this manner.

Grass in summer and roots in winter, with a little hay for the ewes, have been spoken of as the food of sheep. The basis of this system is the turnip crop.—But, in certain cases, this mean of support may fail or be wanting, and it then becomes necessary to resort to other substances. Potatoes, mangelwurtzel, and other roots, may be eaten by sheep as well as by oxen: and cabbages and rape are perfectly suited to the purpose of feeding them.

All kinds of farinaceous food are consumed by sheep. When grain is given, it is the common practice to lay down the sheaves unthrashed, when the sheep readily separate the grains from the straw. Brewers' grains may be given to sheep; and they will consume this nourishing substance readily. Oil-cake, too, is well calculated to fatten sheep, and may be used occasionally where cheaper methods of carrying on the stock are wanting.

Besides common food, there is a condiment, *salt*, of great importance to sheep, as to all domestic animals, but which is too much neglected in the rural economy of this country. If laid on flat stones or in troughs, the animals will quickly find their way to it, and will be seen to wait for their daily portion of salt with as much eagerness as for their periodical supplies of food.

I have spoken of the management of a lowland breed of sheep. It is necessary to consider also the treatment of the animal under circumstances entirely different; that is, when reared and pastured in a country where cultivated food is either wanting or to be procured in limited quantity.

The Cheviot sheep are reared in an elevated country. But in the places where they are produced, turnips and the cultivated grasses may generally be supplied in certain quantity.

In the rearing of this breed, the rams are usually put to the ewes from the middle to the 20th of November, so that the lambs shall begin to drop about the 1st of April. The ewes generally receive no further feeding during the period of gestation than hay in falls of snow. This may be supplied to them from racks, or simply laid upon the surface of the snow. The ground is frequently covered with snow for six weeks, but it is sometimes covered for twice that period. During the winter, therefore, a store of hay should be in reserve for three months' consumption, and this may be calculated at the rate of 1½ lbs. for the ewes and older sheep, and 1 lb. per day for the younger sheep. Should the winter be mild, what is left remains till the following season.

Where turnips are raised, these are given also to the breeding stock. The ewe receives them during falls of snow, and in an especial degree when the lambing season arrives and during its continuance.

When both hay and turnips are to be supplied, it will be proper either to give them at the same time, that is, a portion of hay and a portion of turnips each day, or to begin with hay and end with turnips; for to begin with turnips and end with hay is to cause the sheep to pass from succulent food to one which is less grateful, so that a time elapses before the animals are reconciled to the change. But when turnips are given, and hay supplied at the same time, the sheep take to this variety of feeding very readily.

The process of lambing in these high districts demands the utmost vigilance of the shepherds. They must never be absent night nor day, but relieve one another, and inspect the flock at short intervals, so as to assist the parturition of the ewes when necessary.

Sometimes the lambs at their birth are so weak that they cannot rise to the teat, and thus perish or are forsaken by the dams. The shepherd assists them in such cases, and frequently takes the ewe with her young to a house or place of shelter, where they can be attended to. When the ewes have twins, and thus have two lambs to nurse, it is usual to give them a more liberal supply of food. For this purpose it is convenient to have an enclosure of early grass near the place of lambing or the shepherd's cottage, to which ewes with twins, such as have too little milk, and such as are sick or infirm, or from any cause require more attendance than the rest of the flock, may be taken. Though various ewes produce twins, it is regarded as a favorable circumstance in the case of this class of sheep when one lamb can be reared for each ewe of the flock. It is well when 19 lambs can be reared for every 20 ewes.

As soon as the weather is favorable, after a considerable number of the ewes have lambs, they are collected into a fold, and all the males castrated, except such as are reserved for rams: and the sooner the operation is performed after the lambs are a few days old the better.

When the period of shearing arrives, which is known by the wool being fully grown, the sheep are washed, sometimes by men standing in the pool, who wash each sheep separately, in the manner before described; or, when the flocks are large, and causing them to swim two or three times through the water to the opposite bank. After being washed, they are kept as much as possible on ground where they are preserved from rubbing on banks, or otherwise soiling their wool. In two days, if there be no rain, they may be shorn, but it is better to wait seven or eight days. The wool is shorn in the manner before described, and stored in a proper place till packed in sheets. As soon as each sheep is shorn it may be marked with a stamp dipt in boiling tar. The mark is made on different parts of the body, as near the shoulder, the far shoulder, the near rib, the far rib, so as that the different kinds and ages of the sheep can be known at a glance.

About the middle of July the lambs are weaned, when such lambs as are to be disposed of are separated from the remainder and sold. The lambs, now hoggets, are put on such good pasturage as the farm affords, and supplied, if possible, with turnips throughout the winter, at the rate of a cart-load for 7 or 8 scores in the day.

Some farmers still milk their ewes for a few weeks; but the more approved practice is to milk them only for a few days, merely to relieve the ewes of their milk by degrees.

Before winter, it is a general practice, the utility of which is experienced in a very elevated country, to smear the skins of the sheep with a mixture of tar and butter. The practice indeed is found to deteriorate the wool, by staining it, and rendering it unfit for receiving the brighter colors in dyeing. It is found, however, conducive to the health of the stock in an inclement country, destroying vermin, of itself an important object to the health of sheep, and acting to a considerable degree in defending the animals from cold and moisture.

It is a general error on merely stock farms to plough up too much of the land for crop, or to intersperse the cultivated land with the range of the sheep pasture. The object of tillage on such farms is to raise turnips and clover-hay, for keeping the stock throughout the winter months, and, this being attained, the farmer ought rarely to carry his system of tillage further.

In many cases, indeed, the farmer of a mountain farm has also a sufficient quantity of lowland ground to combine the practice, both of rearing sheep and feeding them. This, when it occurs, is beneficial; but when it does not occur, the proper occupation of a mountain farm is to rear sheep, and not to feed them; and the general principle of management is to sell the sheep which are reared to the feeder as soon as they have come to tolerable maturity, that is, either after the first winter, when hoggets, or after the second winter, when dinmonts.

Reared in yet more elevated districts than the Cheviot, are the Black-faced heath sheep. These are the hardiest of all our races of sheep, and in the parts of the country where they are principally cultivated, they must depend chiefly or entirely on the natural herbage of the farm.

The rams are generally put to the ewes after the middle of November, and one ram is assigned to sixty ewes or less. The lambs intended for weathers are castrated somewhat later than the other sheep: they are weaned late in July, and the ewes milked sometimes for a few weeks. The sheep are shorn from the end of June till the middle of July; and when they are to be washed, they are driven to a pool or deep stream, and forced to leap from the bank. This being a very wild race of sheep, the same delicacy of management is not necessary or practicable as in the case of the more docile breeds of the plains. They are shorn in the same manner as the other sheep; and opportunity is then taken to place upon them their distinguishing marks. In all cases they should be smeared; for though, as in the case of the Cheviot sheep, the wool is injured by the process, this is more than compensated by the benefits resulting to the flock.

The food of these hardy sheep is in summer and winter the same; and all that can be generally done is to supply them with some coarse hay during long-continued falls of snow. They are sold at the ages which suit the nature of the farm and the convenience of the breeder.

The management of the other kinds of down or moorland sheep need not be detailed. These breeds are generally in low situations, where the difficulty of procuring food is comparatively little. The nearer the management of this class of sheep approaches to that of the larger sheep of the plains, already described, the more perfect will it be.

Diseases of sheep.—The diseases of these valuable creatures are sometimes of a very formidable nature, and baffle all the means of remedy which are known to us. Of these diseases the most dreaded is *rot*, which often extends over whole districts of a country.

It is known that this disease is favored or produced by a humid state of the soil and atmosphere. It is in wet seasons that it prevails the most, and is the most fatal. By draining land the tendency to it is lessened or taken away.—Often sheep are rotted by pasturing on the wet parts of the farm, whereas if kept from these parts they remain free from disease. Nay, a single sheep that has a disposition to pick up its food in moist places will die, while the others will not be affected.

The animal affected does not all at once show symptoms of disease; for sometimes it remains a considerable time in apparent health, and long after it has been removed from the place of infection, droops and dies. Sheep are every year purchased in seeming health, and yet after a time they are found to be affected. A moist and even luxuriant autumn is dreaded above all things by the owner of sheep; for the seeds of infection are then often spread to appear, in the following spring, or after the lapse of a longer period.

The signs of rottenness in sheep are familiar to all shepherds. The animal becomes emaciated, its eye becomes dull and glassy, a black purging generally takes place, the wool, on being pulled, comes readily away from the skin, the breath becomes fetid, and the urine is small in quantity and high colored. As the disease proceeds, the skin is marked with spots, and the emaciation increases continually, until the sheep dies. In short, the term rot expresses truly the state of the animal. The disease proceeds with various degrees of rapidity; sometimes it attacks the entire flock suddenly, and sometimes its progress is gradual, and it affects only a given number of individuals. Graziers often avail themselves of the period of the animals beginning to decline to rid themselves of an infected stock. During the first period of being tainted, the sheep have frequently a strong tendency to feed, and if killed in time the flesh may not be perceptibly affected.

In all cases of rot the disease is accompanied by a morbid state of the liver. During the progress of it, the fluke, a small animal, *Fasciola hepatica*, appears on the parts connected with the liver and the gall-bladder. At first the number of these creatures is small, but as the disease advances they increase, and before death are generally very numerous. In the last stage of the disease they have extended to the stomach and other parts.

Frequently the disease terminates favorably, the inflammatory action going off without destroying the parts. But even in this case the taint is rarely removed, and years afterwards, when the animal has been fattened and killed, the liver has been found to be diseased, the flukes being in great numbers.

The best preventive of rot is to render the soil dry; hence on all sheep pastures, the importance of draining. But should the disease, in spite of all precautions, appear, then we should, without loss of time, remove the sheep to a drier pasture, and supply them liberally with proper food. It is only, however, in the early stages of the disease, that a change of food will usually avail. If the disease has proceeded to a considerable extent, even though it should not have evinced itself by any great change in the external appearance of the flock, the animals will often perish hourly amidst the most wholesome food with which they can be supplied.

Of all the medicines that have been proposed for this fatal disease, salt alone is that whose virtue has been established by any satisfactory testimony. The beneficial effect of salt in the prevention and even cure of rot, has been confirmed by the observation of farmers in this and other countries.

Salt indeed will not in all cases prevent or cure the disease; for sometimes the tendency to it from particular causes is too strong to be counteracted, and, when it has once attacked the flock, too violent in its progress to be arrested. But though salt is not a specific, it is the best means of remedy with which we are acquainted.

If salt be placed near the animals in troughs or on flat stones, they will eagerly lick it, and when disease threatens them, it may be given to them in any quantity in which they will consume it; for it is then seen that they are obeying a natural instinct in having recourse to the remedy; and in a wet season when disease may be apprehended, no one should grudge the trouble of so cheap and simple a precaution.

Much has been written upon the subject of this disease, but all that has been written has nearly left us where we were with regard to the remedy. It had been long known that wetness of the soil, however produced, gave rise to rot; that the best preventive was pasturing on dry ground and giving sufficient food, and that the best remedy where disease appeared was a change of pasture. To these results of old experience is to be added, the using of salt.

Another disease, arising from a different cause than the rot, but like it ending in emaciation, and the death of the animal, is provincially termed *pining*. This disease is accompanied by a costive state of the animal, whereas the rot is never accompanied by costiveness; and in the rot the liver is always affected, while in the pining the liver is sound.

This disease seems to arise from the want of exercise, and from the animals feeding on very dry pastures. Before the extensive draining of the pasture-lands, where it is now found, the disease was unknown. The rot was then common; but with the draining of the lands the rot disappeared, and this new disease took its place. The former practice of management in the districts where the disease now prevails, was to keep the sheep in flocks, which were moved about along their allotted range of pastures. They are now, under a more approved system of management, suffered to spread over a large extent of pasture; and thus they are not obliged to take exercise, but are allowed to feed more on a given spot of ground.

A change of place and food is the preventive or the remedy; and if a change of food is resorted to in time, it is generally sufficient to arrest the progress of the disease. Even a removal to a fresh heath will sometimes accomplish the purpose, but the proper and effectual remedy in all cases is a change to a more rich and succulent pasture. The disease is sometimes very fatal, destroying entire flocks like a pestilence.

Sheep are subject to a long and frightful train of inflammatory diseases. In all such cases, however they may affect the animals, bleeding should be at once resorted to, as the only mean of subduing the disease, and giving a chance of safety. The eye-vein is that usually opened in bleeding the sheep; but all shepherds should be taught to bleed from the jugular vein, as being the most suitable. The quantity of blood abstracted must vary with the age and strength of the animals. The rule, in the case of the sheep as in that of the ox, is to bleed freely. The process may be continued until the pulse itself is affected, when it must be instantly stopped. Purgative medicines, too, ought to be given to the sheep, in the case of this class of diseases, and of these the most approved are, Epsom salt in the proportion of from 4 to 6 oz., and about half that quantity, or a little more, of glauber salt. Common salt is often applied in country practice with the effect desired. On the part of shepherds, it is to be observed, there exists a prejudice against the administration of medicines to sheep, doubtless from their having observed the little effect usually produced. But this prejudice should not be permitted to operate where the lives of sheep are in imminent hazard, as is the case in all inflammatory diseases. It is beyond a doubt that by prompt bleeding, and the judicious application of purgatives, the lives of many thousands of these valuable creatures may be yearly saved to this country.

Amongst inflammatory putrid fevers to which sheep are subject, one, termed braxy, is very destructive in various parts of the country. The progress of this disease is very sudden and violent. Of the remedies to be employed, bleeding and purging are plainly those which the nature of the disease points out. This disease seems generally to be caused by bad food, and the most efficient preventive is known to be good feeding. Turnips or other succulent roots given to young sheep feeding on natural pastures are always beneficial; and it is to be observed, that in proportion as the treatment of sheep in a country has improved, this dangerous malady has diminished.

Diarrhœa and dysentery are diseases of sheep. Diarrhœa is frequently produced by too sudden a growth of grass in spring, and it most frequently affects young sheep. It may be generally cured by removing the animals to drier pasture; and a little grain may be always given with good effects.

Dysentery is a more serious disease, and is often very destructive. In this disease, bleeding is plainly required to subdue the inflammation, and purging to carry off the peccant matter in the intestines. Hay may be offered and a few sheaves of grain laid down, and the use of mashes will in an especial manner be found beneficial.

Sheep are liable to various cutaneous diseases—diseases of the skin. The principal of these is termed scab; and it is indicated by extreme itching and eruptions of the skin. When introduced into a flock it may be attended with very serious effects, unless checked by efficient remedies.

The most common remedy for the disease is sulphur mixed with some unctuous substance to fix it on the skin. One of the best receipts perhaps is a decoction of tobacco and spirit of turpentine, with the addition of a little soft soap and sulphur vivum. The decoction of tobacco may be obtained by boiling the tobacco in brine or salt water. The liquid when prepared is applied from a vessel like a teapot with a spout, or from a bottle with a quill passed through the cork. A person lays the wool back in lines so as to expose the skin, and pours out the liquid along the lines upon the skin. But when the distemper is very violent, a mercurial preparation may be required. This is now to be obtained in apothecaries' shops under the name of sheep-ointment. It is made in balls, and when used is dissolved in oil, and applied to the skin of the animal.

Sometimes infected sheep will find their way into the best managed flocks; but every care must be taken to keep the disease from breaking out, or to cure it as quickly as possible when it appears. The infection of a diseased flock is left behind it upon the hedges and pasture-fields, and therefore precaution is to be used before a fresh flock is turned into fields where the infected sheep has been recently feeding.

Another disease of sheep is the foot-rot, which is an inflammation of the foot, followed by an ulceration and destruction of the hoof. The disease chiefly prevails in wet seasons, or in soft grounds. It is a very painful disease, causing the entire lameness and loss of condition of the animal. Certain grounds are noted for communicating the foot-rot; and as it appears among the pasturing stock, season after season, such grounds are commonly said to be infected with the foot-rot. The opinion that it is of a highly infectious nature is universal amongst farmers and shepherds. But however circumstances may seem to favor this opinion, some have conceived that it is more consistent with effects observed to regard it as connected with the state of the pasture-grounds. Yet it is difficult to resist the evidence, that, having been produced, it is conveyed to others of the flock by contact with the ulcerous matter of the diseased foot.

Although painful and destructiev to the good condition of the animal, this disease is not absolutely fatal, except under entire neglect, in which case the animal becomes unable to seek his food, crawls upon his knees, and, worn away by exhaustion, perishes. But if early attention be paid, the disease admits of remedy. In the first place, let all the infected part of the hoof be pared away, and the ulcerous matter removed, and then let the foot be washed with soap and hot water, and let the surface be dressed with some caustic, of which the best is muriate of antimony. In incipient cases, by simply paring the hoof and cleansing it with soap and water, and then dipping it in boiled tar, the progress of the disease will be arrested.

The next disease to be mentioned is of frequent occurrence. This is hydatids, staggers, or water-in-the-head as it is frequently termed. The cause of this disease is a parasitic animal, a hydatid, which is found in the brain of sheep. It enlarges in size, and, if not removed, ultimately destroys the animal. This creature when distended with fluid resembles a round sack filled with water, and hence it was long supposed to be water, and the disease, in consequence, termed water-in-the-head.

When the hydatid is in the brain, the animal affected shows great symptoms of distress; he leans his head to one side, mopes by himself, continues turning round, and finally dies. The remedy for this disease is to reach the hydatid, and to extract it, or at least to perforate it in such a manner as to destroy its vitality. When it is situated at the surface of the brain, the part feels soft, and it may be reached by a sharp instrument, as a common awl or gimlet, or the hydatid itself may be extracted. This may be done by the trephine. Shepherds perform the operation in a rude manner by a sharp knife. A small portion of the skull is so cut, as to be raised up like a lid. The hydatid being exposed, is pulled out by pincers, and the fluid absorbed by a sponge or piece of linen. The skull is then replaced, and dressed with common tar put upon a piece of soft leather.

Often the hydatid may be reached by a wire thrust up the nostrils, and it is remarkable that this operation frequently succeeds in the hands of shepherds.

Sheep are liable to the attacks of various animals. One of these, a species of aphis, termed the sheep-louse, is very common, and chiefly prevails where the sheep are in an unhealthy condition. It is of a flat form, and attaching itself to the throat and other parts, occasions much irritation. Tar, turpentine, or tobacco liquor, are the substances chiefly used to destroy this animal, and any simple mercurial preparation is effectual.

But the most pernicious enemy that attacks sheep is the common sheep maggot, the larvæ of a species of flesh-fly. The fly having deposited her eggs on the skin of the sheep, the larvæ are hatched in great numbers, and grow with amazing quickness. They commonly appear about the root of the tail, or wherever filth has allowed the fly to attach her eggs, and thence they spread over the entire body, consuming the skin and eating into the flesh. The sheep, when attacked, manifest a strong sense of suffering. They frequently run with violence, until at length, overpowered and exhausted, they lie down and perish.

It is in moist and warm seasons of the year that the sheep-maggot is chiefly produced. Constant vigilance is then demanded on the part of the shepherd, so that all foulness of the wool shall be clipt away; and the sheep must be daily inspected, lest this dangerous enemy establish itself. The maggot is effectually destroyed by a solution of corrosive sublimate, and in its early stages by less potent applications, as by urine and lime.

We must remember that the sheep, in his domesticated state, is yielded up to the care of man; his natural instincts are blunted, and he is unfitted to use those means of preservation which in his wild state he might possess. He is the prey of a multitude of enemies, against which he has no defence; and the more artificial his condition is, the more is he dependent on our care.

The *bot* the *æstrus* of the sheep, although smaller than the bot of the horse, is nevertheless a most formidable insect; body of a dark brown color, spotted with white, the white sometimes prevailing so much as to give a greyish hue to the fly. It abounds most in June and July, and may be found on rails in the vicinity of clumps of trees or underwood, and may then be easily crushed or destroyed, if the farmer will but make himself acquainted with it. If only one of them appears, the whole flock is struck with terror; and if there is any place in the field devoid of pasture the sheep crowd to it, turning their heads towards the centre of the group, with their muzzles to the sand, and their feet in continual motion in order to secure themselves from the attack of their foe.

The *fly* endeavors to get at the inner margin of the nostril, and darting upon it with the quickness of lightning, deposits her egg. The warmth and moisture of the part speedily hatch it, and the little worm escapes. It crawls up the nostril, it threads all the sinuosities of the passage, and finds its way to some of the sinuses connected with the nose. The irritation it produces in its travels is exceedingly great; the poor animal gallops furiously about, snorting violently, and almost maddened by the annoyance. The worm at length reaches some of the convolutions of the turbinated bones of the nose, or the antrum or cavity of the upper jaws, or the frontal sinuses, it fastens itself on the membrane by the two hooks with which, like other bots, it is provided, and there it remains until April or May in the succeeding year. There are seldom more than three or four of these bots in each sheep; and when they have reached their appointed home, they are harmless. Some strange but groundless stories have been told of gleet from the nose, giddiness, and inflammation of the brain having been produced from them.

Sheep, it is seen, are generally pastured in summer, and their winter keep, on all good farms, consists of an abundant supply of roots, good sweet hay, &c. with free access to air and water.—Sheep require air and exercise to some extent in the coldest weather. It will not answer for us to adopt the English system of letting them run at large, for it is a well established fact, that sheep, as well as cattle, thrive better, and are not so much disposed to sickness during the summer, if they are sheltered from the storms of cold and of the preceding winter. The sheep-house should be well ventilated, with a yard attached in which the sheep may exercise themselves at pleasure in all fair weather. Owing to the variety of breeds, the great diversity in the surface of our country, the variations of climate, and other circumstances combined, it is impossible to lay down any fixed or specific rules applicable to the management of sheep in all parts of the Union.

There are, however, some points of universal application—these relate to the breed or character of the animal. Every farmer should select the best and purest blood; and the treatment of his flock must be most kind and gentle; they should never be teased, worried, or submitted to the care of inexperienced persons, or persons of ill and ungovernable temper; such persons invariably do more harm than good on a farm, and the farmer should shun them as he would the rot. If your sheep have been well summered, and you have a good supply of the sugar beet, which is the best article for fattening sheep that I am acquainted with, you will have no difficulty in carrying your flock easily and comfortably through the winter, however severe; and at the springing of the early grass they are in good condition.

The *age of a sheep* may be known by examining the front teeth, which are eight in number, and appear during the first year, all of small size. In the second year, the two middle teeth fall out, and their place is supplied by two new ones, which are readily distinguished by their being of a larger size. In the third year, two other small teeth drop out, one from each side, and are replaced by two large ones, so that there are now four large teeth in the middle, and two pointed ones on each side. In the fourth year the large teeth are six in number, and two small ones remain, one at each end of the range. In the fifth year, the remaining small teeth are lost, and the whole front teeth are large. In the sixth year, the whole begin to be worn, and in the seventh, sometimes sooner, some fall out or are broken.

In addition to what the reader has already seen in regard to the management of Sheep, we add some further observations from the pen of Mr. Fessenden, author of the "Complete Farmer," relating particularly to Winter-keeping of Sheep, and then conclude this section with some statistical facts which will be found interesting.

Mr. Fessenden says—

Perhaps there is no domestic animal that requires more nice and constant attention than the sheep, and no other that will more richly pay for generous keeping. Though he may not be more liable to disease, nor require a better quality of food than neat stock, still that management which will keep cattle in good case will not answer for sheep. His habits and mode of feeding are entirely different. For instance, in the winter season, a cow may be kept tied to the stall twenty-two hours out of the twenty-four, and, if well fed three times a day, keep her flesh and get sufficient exercise for her health. Serve a sheep in the same manner, and it would not probably live a month. It is natural for sheep to move about and change situation. Turn a flock of hungry sheep into a pasture, they will run to the end of it before they begin to eat; feed them in troughs, they will run over all till they come to the last, when they have it in their power. They are almost continually shifting situation from hill to dale, from one kind of food to another; and it is a fact, that sheep will thrive better on two or three different kinds of ordinary fodder, than they will to be confined to one kind that is of a superior quality.

The proper time to yard sheep in the fall, is while they are yet in good order from fresh feed, and before the frost takes the nourishing qualities out of the grass: but at a time in which many sheep are not folded, they are left to nibble over the frozen pastures till they lose the flesh of half a summer's keeping, and which takes half a summer to regain. It is a great error which is persisted in, with an idea to save fodder. But setting aside the injury done pastures by close feeding at this season of the year, the sheep which stray away and are lost, and the time spent in hunting them, which are not idle considerations, the farmer would more than get repaid for his extra fodder, and a few week's attention in yarding his sheep sooner, by preserving their health and condition. When they are put in winter-quarters, they require as much variety as possible; not that they want so much room, but they need a number of apartments. Two yards and one shed will do very well for one flock; or what will answer the same purpose, if a large number of sheep are to be kept near each other, have the yards in a row, and one more yard than flocks of sheep. Then, by shifting one flock to the spare yard, it leaves another vacant, and so on. Thus may all be changed, which should be done at every time of feeding. As fast as the yards are empty, the food should be put into them, and never while the sheep are there. One hundred sheep are enough to be kept together. Cleanliness is of the utmost importance. Their yards should be littered with straw or something of the kind, constantly, or they will be in danger of losing in a degree a relish for their food.

The next thing necessary is, to have proper places for your sheep to eat hay in, which are the common board mangers, and may make partings to the yards. Take six joists, say three inches square, and four feet long; have the boards of a length, then nail two of them to the joists set up perpendicularly, in such a manner that one joist will be in the middle of each board, and the other two at the ends, and that the top edge of the boards will be one foot from the ground; then nail short boards to the ends two feet and a half long, the width of the manger, the next board on the sides to be placed eight inches from the lower boards; then board it tight to the top of the joists and the manger is finished. A manger eighteen feet long, of this description, will accommodate thirty sheep. Single mangers may be made along the outside fence of the yard, which do not require to be so wide. The great superiority of these mangers over racks is, first, the facility of putting hay into them without dropping it on the ground; secondly, it obviates the danger of hay-seed falling on the wool of the sheep; and thirdly, it prevents any waste of fodder. The next thing after mangers for hay, should be a place appropriated for feeding out roots, which every farmer should raise to a certain extent. Although we cannot turn them to so good an account as the English feeders do, on account of the severity of our winters, still a proportion of them, as food for our stock, is of great importance. In order that the farmer may make the most of his roots, he should have a cellar fixed to receive them in the fall, without too much labor, and accessible at any time in the winter, without endangering them by frost. The cellar should be placed as near the yard as practicable, with a watering place at hand. A good way of washing roots is, to have an oblong box that will hold two or three bushels, with the bottom perforated with auger holes, and rockers placed on the under side of the box; then, by pouring a little water and rocking them, the dirt will directly wash through the bottom of the box. They should then be cut fine with a sharp shovel, and they are fit for feeding out. Browse in the winter occasionally for sheep is very palatable, and is of considerable use in preserving their appetite, and as a change of food; but care should be taken to select the right kind. There are many kinds of hard wood, of which the bark and buds are very injurious.* The bark of the black cherry eaten by ewes with lamb, is almost sure to produce abortion.—Generally, winter-green is to be preferred to any other browse. White and yellow pine are best.

Regularity in feeding sheep is of prime consequence in cold, dry weather. It is not necessary to feed them oftener than three times a day, if discretion is used in the quantity of fodder. In warm weather, and especially if it is muddy, they should have little at a time, and be fed four or five times a day. Daubenton and others calculate that two pounds of hay are sufficient for the support of one sheep a day, (which, by the way, is not enough.) Calculations of this kind, if made with the utmost accuracy on one, or any number of sheep at one time, will not apply to the one sheep at another; because so much depends on circumstances.—A sheep that will eat three pounds of hay in a cold day, will not, perhaps, eat more than two in a warm day following; and still less in a damp one. Not that they require so much more food in cold weather than in warm, but that sudden changes affect their appetites and without injuring their health. Again, a sheep of proper form and inclination to fatten, will not need so much nutriment to preserve its health, as one of the same weight of a coarse, rawboned, uneasy make.

From present experiments, the introduction and raising of SHEEP on the vast prairies of the West are to be anticipated, and it would not be surprising if there should be a great change in the territory to which the consumers of wool must look for much of their raw material. Hitherto, the New-England and Middle States have principally furnished the market with wool. But sheep are already beginning to acquire importance in the view of the farmers and planters of the West and South; and if the importation of 1100 merino bucks in a single year into South America, produced such a change in their flocks, why may not equally as striking a result be effected in the Western and Southern States by a similar introduction there? Millions of sheep could be sustained at little expense on the belt of the oak-timber land running through Georgia, seventy miles wide by one hundred and fifty miles long. Indeed, there is scarcely one of the Southern States but would furnish some good section for the keeping of flocks on the uplands. Planters are now also actually beginning to collect their flocks. The sheep-raising States of the North must expect competition. The farmer in the higher and colder latitudes, who has to fodder his flocks for a long winter, will certainly feel the effect of this new direction of sheep husbandry, brought, as he will be, into competition with those who enjoy the advantage of an almost perennial spring. So soon as the planter ceases to be absorbed in the production of cotton, the streams of the South will be lined with mills, and various operations of machinery. The Northern and Middle States cannot but see that it will do so. There are many locations south and west of the Delaware, where three sheep at least can be kept as cheap as one can on the confines of the Canadas.

Pasturage to almost any extent covers the prairie range, and grass or grain for a short winter's feed, are cut and reaped by machines at

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[*] The wood disease, so much complained of in France, is wholly owing to sheep eating fresh buds.

a trifling expense. One gentleman, it is stated, in the vicinity of Buffalo, New York, having a prairie farm in Illinois of some five hundred acres, purchased two thousand sheep, which he placed upon it, under the care of two faithful shepherds. The sheep were kept without difficulty in the best of health, and the proprietor, as the first fruits of his enterprise, received six thousand pounds of good wool, worth thirty cents per pound. The transportation from Illinois to Buffalo cost about one cent per pound. These facts are mentioned, not to discourage effort, but to prepare the producer of wool to meet the condition of things that must soon take place, in a state of general peace and depression of price of all the staple products.

THE GROWTH OF WOOL.—A correspondent of the Washington Union (Sept. 1845) furnishes some interesting information in relation to the growth of wool. He says the article is now being bought in New York for shipment to England, inasmuch as it is found to bear a higher price there than in the United States. He says that the prairies of Illinois, Iowa, &c., are likely to form a grand scene for the rearing of sheep; and adds that the time is not far distant when the valley of the Mississippi will fully compete with all other parts of the world in the growth of wool.

In 1800, in England, the number of short-wool sheep was 14,851,297. Weight of fleeces varied from 3½ to 9 lbs.; the average being 6 or 7 lbs.; the number of packs at the same period was 198,475. Number of long-wool sheep at the same time was 4,153,508; number of packs, 131,799; weight of fleece was from 3 to 9 lbs.; average about 6 to 6½ lbs.

In 1828, the number of packs of wool were 120,655 of the short breed, and of the long fleece 263,847 packs.

The importation of wool into England, from 1818 to 1833, in sterling value was as follows:—

1818	£38,000	1830	£ 120,000
1820	181,000	1832	102,000
1825	163,000	1833	137,000

The price of South Down wool in England, from 1784 to 1833 rose from 17 cents in 1784, to 69 cents (its highest price) in 1809, and 60 cents in 1817; the average being about 28 to 30 cents.

The average price of wool in London, 1836, was as follows:—

Spanish Fleeces,	46 to 70 cents.
German do.	92 to 00 "
Austrian and Bohemian do., best,	50 to 75 "
Best Australian and Van Dieman's Land,	23 to 72 "

The declared value of the exports of English woolen cloth was as follows:—

In 1830	£4,000,000	In 1833	£6,000,000
In 1831	5,000,000	In 1834	5,000,000
In 1832	5,000,000	In 1835	6,000,000

The English Farmer's Magazine, (June, 1845,) in a "Review of the past, present, and future state of the wool market," concludes as follows:—

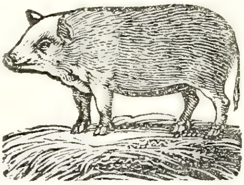
"The considerations and facts which we have now adduced, as likely to affect the price of wool, are strong in favor of its future prospects, inasmuch as stocks on hand are comparatively light, and the whole European supply will be considerably deficient, while the general consumption is likely not only to be sustained, but even increased, if not checked by too sudden a rise in price, which would be very prejudicial to all parties."

According to the agricultural statistics of 1840, embraced in the census returns, the total amount of wool produced in the United States amounted, in that year, to 35,000,000 pounds, viz:

1	million	(round numbers)	in	Maine.
1	“	“	“	New Hampshire.
3	“	“	“	Vermont.
7	“	“	“	New York.
3	“	“	“	Pennsylvania.
1	“	“	“	Tennessee.
1	“	“	“	Kentucky.
3	“	“	“	Ohio.
1	“	“	“	Indiana.

Almost every State in the Union, besides those named, produces from 200,000 to 600,000 and 800,000 pounds.

The woolen manufactures in the same year stood as follows: In 1839, the number of fulling mills amounted to 2,000. In same year, woolen manufactories amounted to 1,420—capital invested about $15,000,000.



☞ A friend of the compiler of this work—an old and intelligent farmer—among other suggestions as to what the book ought to contain, mentioned that he had a cure for the Swelled Throat in Hogs, which he considered worth more than the price of the book to any farmer—that he had, by its timely use, saved the lives of several valuable animals, and that whilst coming to town he saw lying on the roadside a fine large hog that had died of this complaint. The disease, he observed, was most apt to occur with hogs feeding on mast or nuts in the autumn.—The throat of a hog affected with it swells, and the animal will be seen crouching on its belly with its head between the feet.—The disorder may be prevented by feeding occasionally with tar mixed with feed in a trough. The hog has what are commonly called " sweat holes " in his fore legs—he must be turned upon his side and these holes rubbed well with a corn-cob and dishwater till they get red—turn over and rub the other leg—open the sweat holes with a knitting needle—take a tinfull of sweet milk with some brimstone in it, moderately warm—put a stick in his mouth to keep it open—pour in the mixture slowly—bleed under the tongue—if no blood, cut across the tongue in the shape of an X.—Then take the yolk of an egg, a charge ol gunpowder and a little hog's lard, simmer them over coals—not too hot—rub it over the sweat holes in the legs and under the jaws.—Observe the effect for an hour or two, and if the hog is not relieved, repeat the treatment. In this disease there is a collection of water about the heart, which must be arrested by restoring the functions of the sweat holes, or the sack containing the water will burst and cause death instantly.

A general notice of the diseases of swine will be found at the end of the following section.

THE HOG.

One of the most remarkable circumstances in the history of the domestic hog, is his general distribution over so many countries and distant islands, where no trace of any wild animal of the species exists in record or tradition. He was found extensively in the islands of the South Sea, when first visited by European voyagers, furnishing the principal animal food of the natives; and he exists in vast numbers in China, and the islands of the east. But what is remarkable, he is not indigenous in America, but was carried thither by the Spaniards; and he is not found amongst the quadrupeds of New Holland, though he has now multiplied greatly there. This universal diffusion he seems to owe to his extraordinary fecundity, his adaptation to every climate, and the facility with which he may be transported from one place to another.

The hog, though chiefly herbivorous in his natural state, may be fed equally well on animal food. It is this which renders him the most easily and cheaply reared of all the domestic quadrupeds.

Like the horse, the ox, and the sheep, the hog is affected in his character, size, and form by the physical state of the countries in which he is naturalized. But he is more the creature of artificial feeding than the sheep, the ox, or the horse; and hence his size is not so much dependent on the nature of the country in which he is reared. To the variations produced on him by external causes, we apply, as in the case of other animals, the term *breeds*.

Among the various articles of live-stock, few are more profitable to the breeder than swine, while the number kept on a farm is proportioned to the quantity of offal on the premises; especially as the attendance they require is, when compared with that of others, very trifling, and the benefit arising from their dung more than counterbalances such attendance. The *characteristic marks* of a good hog are, a moderate length, as to the carcass in general; the head and cheeks being plump and full, and the neck thick and short; bone fine; quarters full; the carcass thick and full; his bristly hide fine and thin; the symmetry or proportion of the whole well adapted to the respective breeds or varieties; and above all, a kindly disposition to fatten early.

In consequence of the numerous sorts and varieties of these animals, found in almost every country, it is scarcely possible to ascertain which are the original breeds; under this head, therefore, but little more can be attempted than a brief notice of those most generally esteemed, and known under the following denominations:

The CHINESE BREED, were originally obtained, as their name imports, from China. Of these there are two nearly distinct kinds: the *white* and the *black*: both are small; and although of an extraordinary disposition to fatten, will seldom arrive to a greater weight than two to two hundred and fifty pounds, at two years of age. The former are better shaped than the latter; but they are less hardy and less prolific.

The Chinese hog is of the widely extended Siamese breed of the east, a race which extends from the Continent to the islands of Sumatra, New Guinea, and others, and to all the islands of the South Seas. The true Siamese breed has the skin of a rich copper color, but, like all the domesticated animals, the color varies with conditions of climate, food, and culture. In China the color is often white, and it is with the varieties derived from China, that we are the most familiar in this country.

The Chinese hog is for the most part less than the common swine of Europe and America, but it is distinguished by its peculiar apptitude to fatten. Its bones are small, its limbs short, its ears erect, its skin and bristles soft, and its general aspect delicate.

The introduction of this race has insensibly produced a great change in the character of all the breeds now cultivated. It has been made to cross the greater number of them. It has diminished the size, but removed the former coarseness of form, and increased the aptitude to fatten. The pure breed is little cultivated, and it is through the medium therefore of its crosses with the native stock, that its value is chiefly known. In this respect, the introduction of the eastern hog into other countries has been singularly beneficial.

THE BERKSHIRE BREED.—The specific characters of the Berkshire breed are a reddish color, with brown or black spots; sides very broad; body thick, close, and well formed; short legs; the head well placed, and the ears large, and generally standing forward; but sometimes pendant over the eyes. Another distinctive mark of this breed is, that the best are without bristles; their hair is long and curly, and from its rough appearance, seems to indicate coarse skin and flesh; but in fact, both are fine, and the bacon is of very superior quality. The hogs arrive at a very large size, and have been reared even to the weight of nine hundred pounds. The Berkshire was the earliest of the improved breeds of England, and is now the most generally diffused of all others, in that country and in the United States; in both of which it is very justly regarded as one of the superior breeds, combining good size with an aptitude to fatten. This improved and valuable breed has been undoubtedly formed by a judicious mixture of the blood of the Chinese or Eastern hog with the native breed of England. The great improver was a gentleman of the name of ASTLEY, of Old-stone-hall. The importation of this breed into the United States, within a few years past, has been quite extensive—it still continues—and as the Berkshire has become a general favorite among many of our farmers, we may anticipate the best results from their wide diffusion and amalgamation with the best of our present breeds.*

The SUSSEX BREED is either a variety of the Essex, just described, or, as some assert, the original stock. It is smaller than the Berkshire, and of very handsome form, the general size when full grown seldom exceeding two hundred and eighty pounds. The bone is not particularly small, but it is clean; the animal is of a kindly disposition to fatten, and arrives at maturity sooner than any other kind.

The DISHLEY BREED, which were at one time as celebrated as all the other kinds of Mr. BAKEWELL's stock, are remarkably fine boned and delicate, and are supposed to be partly descended from crosses of the Berkshire and Chinese.—They were certainly carried to great perfection, and have reached to considerable weight in a very small compass, being, when fat, nearly equal in height, length, and thickness; their bellies nearly touching the ground, and their eyes scarcely to be seen for fat; the whole carcass appearing a solid mass of flesh. The form of these pigs possesses considerable beauty, and is well calculated to lay on a large quantity of meat, compared with their bone and offal. They also keep themselves in good condition on a moderate quantity of food, and are easily fattened.

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* Indeed, a great change has taken place in this particular, and it is a rare circumstance indeed, to meet with, at the present day, in our improved agricultural districts, even a remnant of the "old fashioned, thin, long-legged, long-nosed, gaunt-bodies, ugly race of hogs of former days." Pennsylvania has ever been noted for the peculiar excellence of her swine; but other states it would seem are now in a fair way to take the lead.

Such are their general characteristics; but to these merits there are said to be opposed very considerable defects. They have been found slow of growth, tender constitutioned, and to require proportionally more food in fattening than the large breeds. It should, however, be remarked, that the experiment upon which the latter assertion is founded, was made by feeding *two* Dishley hogs against *one* from a cross between a Berkshire and a large white Shropshire hog; and that while the Dishleys consumed *jointly* the most food, the other weighed singly more than the two. This, however, is not alone decisive of their respective merits, which could only be accurately ascertained by a reference to the butcher; as a material difference would no doubt arise in favor of the sale of two small animals, when opposed to that of a single large one.

THE WOBURN BREED is a new variety, introduced by the duke of Bedford, and hence sometimes called the *Bedford breed*. They are of various colors, well-formed, hardy, very prolific, kindly disposed to fatten, and have attained to nearly twice the weight of some other hogs within the same given period of time. This breed has been imported into this country, and is highly esteemed by many of our farmers; they are justly acquiring great celebrity.

Besides these there are:—

The *Hampshire*, the specific characters of which are—color chiefly white; neck and carcass long, and the body not so well formed as the Berkshire pigs; but they fatten kindly to a very great size and weight, and make excellent bacon.

The *Northampton*, which are also white, with very short legs, ears enormously large, often sweeping the ground; size large, with coarse bone and hair, and many bristles. They fatten to a great size, but not very kindly.

The *Shropshire*, which appear to be a variety of the Northampton race, to whose characteristics they bear a great resemblance; fattening to a large size, but not so kindly disposed as the Berkshire; yet they are both favorites with the distillers, who seem to require a coarse heavy pig to consume their wash and grains with advantage.

The *Yorkshire*, which are similar in color to the Berkshire but with longer ears and coarser hair. They have long legs, flat sides, and are coarse in the bone; they are also slow feeders; but for the reasons already assigned, they, as well as the Northampton and Shropshire, are in esteem with the distillers.

The *Lincolnshire* with well-formed heads, and ears of a medium size pointing forwards, and curled at the lips; they are long and straight from the head to the tail, and of sufficient breadth; round in the carcass and deep in the sides; the skin and hair thin. The true bred pigs of this race are white, and rather tender; but they reach to thirty stone, of fourteen pounds, and in point of profit may be ranked next to the Berkshire. This breed is also well known (with some occasional variation) as the NORFOLK and SUFFOLK. The CHESHIRE, of various colors, but chiefly marked with broad patches of black, or blue, and white, have large heads with long pendant ears; are of a great length, but proportionably narrow; curbed in the back and flat-sided; large-boned and long-legged, with much loose skin, and altogether ill-formed: but they grow to an extraordinary weight, and are the largest kind of pigs in the kingdom except

The RUDGWICK BREED, which take their name from a village on the borders of Surrey and Sussex, and are remarkable for the enormous size to which they reach; each of these breeds has its several advocates; but as their respective value does not, as in other species of stock. depend on soil and situation, these differences of opinion can only be ascribed to the want of sufficient comparative experiments, or to prejudice. A very competent, and apparently a very candid judge of the merits of the principal kinds, give it as his decided opinion that the Berkshire rough-haired, feather-eared, curled pigs, are superior in form and flesh to all others, even to the best Chinese.

With regard to these two breeds, that opinion must have been formed on fair experiments and due consideration of their respective value, for he mentions having fatted a Chinese sow to the weight of five hundred and sixty pounds at three and a half years old, and the quality of the bacon of both kinds, fatted and cured alike, was decided by a party of gentlemen at Lord Conyngham's table in favor of the Berkshire. In this we so far unhesitatingly coincide; but from all the other information we have collected on the subject, we are inclined to think that Mr. Western's Essex breed, may fairly compete with either; and the Woburn breed, has not yet been sufficiently tried to admit of a decisive comparison.

To these also, there must, in justice be added, a breed partaking of the Essex blood and generally known as the *Essex* and *Hartford breed*. It was introduced by Mr. Dodd, of Chenies, in Buckinghamshire, (a most successful breeder.)

The Essex Black pig, descendents of the Berkshires, are reckoned, according to the Editor of the Complete Grazier, among the finest breeds.* He describes them as black and white, short-haired, fine skinned, smaller heads and ears than the Berkshire; but the latter are feathered with inside hair, which is a distinctive mark of both; short, snubby noses; very fine bone, broad and deep in the belly, full in the hind-quarters, but light in the bone and offal; the sows are good breeders, and bring litters from eight to twelve. They have the character of being bad nurses. They feed remarkably quick, grow fast, and produce meat of a most excellent quality. Mr. Western, of Felix Hall, took great pains in the improvement of the race.

We have, as before observed, a variety of breed of native growth, or crosses with foreign importation, possessing many very superior traits of excellence.—E. Phinney, Esq., one of the most intelligent, public spirited, and successful farmers of this country, has on his place in Massachusetts, a variety called the *Mackey breed*, which have taken several premiums at Brighton and other fairs.—This breed is very highly esteemed throughout New England.

Form.—The same external characters indicate, in the hog, a disposition to fatten as in the other live-stock; and there is no other animal which can be made by cultivation to present so great a combination of these characters, or which can be so easily improved in its form, from the facility with which it receives the character of its parents, and from its rapid powers of increase. The chest should be deep and broad, the ribs largely arched, the neck short, and the head and limbs small; the bristles should be soft, approaching to hair, and the skin soft and elastic.

Rearing and feeding.—The sow goes with young 112 days. She is fit to receive the male in the first year of her age, and the latter is able to propagate his species at the same early period, but he should be at least 12 months old before he is admitted to the female. The female produces from 5 to 10 or more at a birth, and she can easily be made to produce and rear two litters in the year; and she may even rear five in two years. She is ready to receive the male soon after the birth of her young; but the time should be chosen which allows her to produce her litter at the most convenient season. Thus, if she is to be made to litter twice in one year, the first should, if possible, be produced about the beginning of April, and the second about the beginning of September, so that the last litter may gain full strength before the arrival of cold weather.

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* Mr. Samuel D. Martin, in a communication to the Editor of the Franklin (Kentucky) Farmer, speaks of this breed in the highest terms, and recommends them to the notice of his brother farmers, as being better adapted to rearing in that state than almost any other breed whatever. Their excellence, he says, consists in their early maturity, large size, the ease with which they fatten, hardiness, productivenes, and being excellent travellers. He states, that a pig of this breed, sold to a Mr. Phelps, when seven months old, was weighed every ten days, and found to increase fifteen pounds, or a pound and a half per day. As an instance of their capacity to take on fat, he cites another instance of a boar, weighing two hundred and sixty-seven pounds; in thirty days he was weighed again, and was found to have *gained precisely one hundred pounds*, a fraction over three pounds per day.

When the sow is with young, she should not be wholly confined to a pen, but be suffered to walk at large in a yard or other convenient place, care being taken that, as the time of producing her young draws on, she shall not be crowded with others, lest she be injured by their feet.

The time when she is about to produce her litter will be known by her carrying straw in her mouth to make her bed. Before this, however, she should have been separated from her fellows and carefully littered. The straw should be short, and not in too great quantity, lest the pigs, nestling beneath it unperceived by the dam, be crushed by her when she lies down.

While nursing, she should be well fed, and the pigs accustomed to feed from a trough or milk, whey, or any liquid food, mixed with a little meal or bran.—In 30 days the males may be castrated, and a like operation, though not absolutely necessary, may be performed upon the females at the same time.

During the period of nursing, the dam and her young should be lodged dry and warm. They should be fed three times in the day with whey, milk, and a little water slightly warm, mixed with bran, meal, or any farinaceous substance, and when the pigs are in the course of feeding from the troughs, the mother may be allowed to go at large for an hour or two.

In six weeks, if they are well fed, the pigs may be weaned, but should they not have been well fed, eight weeks will be required. When weaned, they are to be fed three times a day with wheat-bran, barely-dust, or any farinaceous food, mixed with water warmed to the temperature of the mother's milk, and with whey, or other refuse of the dairy or the kitchen. In a few weeks they will begin to eat potatoes, turnips, and all other food.

The young pigs are sometimes disposed of when sucking the dam. In other cases they are sold when weaned to persons who design to feed them ; and in other cases they are fed by the breeder himself.

When they are fattened by the breeder, two modes of feeding may be adopted. They may be either suffered to go at large, or they may be kept in pens and houses. By the first of these methods, after being weaned and fed for a period till they are able to shift for themselves, they are turned abroad to pick up what they can in the straw-yards, a little green food, as tares or clover during summer, and turnips or potatoes during winter being supplied to them. They do not, under this management, receive any more expensive feeding until they are put up finally to be fattened, when they are confined for a few weeks, and fed on farinaceous and other food. The pigs intended for this species of management should be the best of the smaller varieties ; and they may be killed for domestic use, or disposed of when of 7 or 8 stones weight. All the accommodation required under this system of management, is a few pens with sheds ; first, for the breeding swine when nursing their young; and second, for the pigs which are in the course of being fattened.

In all cases upon a farm, a certain number of pigs may be kept at large in this manner for picking up the waste of the farm-yards. But the regular course of management, and that to be adopted where the feeding of the animals is carried on the larger scale, is to have separate feeding houses for the pigs, in which a greater or lesser number can be kept.

The same general principle of feeding applies to the hog as to the other domestic animals. The breeding stock is to be kept in good order, but not over-fed ; the feeding stock is to receive a full allowance of good food from the period of weaning until it is fat.

The food of the feeding pigs is every kind of animal refuse, as that of the dairy and kitchen. Roots of any kind, raw and boiled, will be eaten by them ; but it is better that this species of food be boiled or steamed. Bran steamed or boiled, is likewise a nourishing food for pigs ; beans and peas bruised may be also given to them ; and brewers' grains and wash furnish one of the best kinds of food that can be supplied ; but the pork will not take and retain the salt as readily as that fed on more solid and substantial food. Hay or dried fodder is not relished by this class of animals; they require food of a moist and succulent kind, and therefore, though they dislike dried forage, they will not refuse hay and even straw if chopped and boiled. They feed on green food of all kinds; and hence clover, lucern, and tares may be employed in feeding them in summer, though to fatten them finally some farinaceous or other nourishing food will be required. They will also graze like sheep or oxen, but grass consumed in this manner is not the natural food of the animal, which consists of roots rather than of herbage. The feeding of pigs on herbage, is merely to carry them on for a time till more fattening food can be procured for them. When fed on herbage, a ring must be passed through the cartilage of the nose, to prevent their following their natural instinct of ploughing up the ground, but the same purpose may be more effectually served, by dividing the tendons by which they are enabled to move the snout. Acorns and beech-mast are a favourite food of the hog, but these are rarely furnished in sufficient quantity for the purpose of feeding, though in cases where there is access to woods producing these fruits, hogs may be turned into forests with advantage. All kinds of spoiled or waste fruits may be given to them; and in the cider districts accordingly, the refuse of the cider press is employed for feeding them. In short, the animal is omnivorous, and there is not any species of animal or vegetable food which may not be given; and in the case of no other of the larger animals accordingly is the process of feeding so simple.

Pigs ought to be fed three times in the day, and the troughs in which the food is placed should be emptied before a fresh supply is given, and kept perfectly clean. It is well to vary their food, to mix it with water or other liquid, and not to overload them by too much at a time. It is a great error to leave these animals in a state of filth and neglect. The hog is not a filthy animal by choice; he delights in a clean bed; he will wallow indeed in the mire like the elephant, the rhinoceros, and other thick-skinned animals to which he belongs; but this is not because he prefers filth, but because he loves coolness and moisture.

There are two purposes for which pigs may be fattened. The one is to yield pork, which may be used either fresh, salted, or pickled, and the other is to produce bacon, which is prepared by salting and drying the flesh. When fed for pork, which is the most convenient system in the practice of the farm, the pigs may be reared to the age of six or eight months; when intended for bacon, they must be reared to a greater age and size, as ten or twelve months. When the object is pork, the smaller class of early-feeding pigs is to be preferred; when bacon is desired, the larger class should be cultivated.

We have thus given a detailed statement of the best practice adopted abroad for the feeding and rearing of this most important and valuable animal. The practice of feeding in this country is more varied, and in some instances entirely different. Maize, or Indian corn, has long been used as the principal food for preparing swine for the market; the practice which formerly obtained, even among many of our most thrifty farmers, was to let the animals run at large, uncared for and unattended, until such times as they were to be taken up for fattening. In many instances where the animals had the range of a forest, and an abundance of nuts, they were generally in pretty good condition, and required but a few weeks attentive feeding to prepare them for the butcher; but to effect this, a much greater amount of grain was used than was absolutely necessary, it being almost universally fed out in an uncrushed and uncooked state.

Economy in the feeding of all kinds of farm stock has engrossed the attention of many gentlemen; it is a subject of vast importance, not merely to the individuals immediately interested, but to the nation at large. From a vast variety of experiments, made by different persons, in all parts of the Union, and under almost every variety of circumstance, the fact is established beyond all controversy, that so far as swine are concerned, there is a saving of at least two-fifths of the amount of the ordinary food requisite to fatten a hog, by steaming or cooking it. That is, three bushels of grain, (corn, for instance,) properly prepared by cooking, will go full as far towards fattening a hog as five bushels in its raw and uncooked state.

The result of an experiment is found in the Annual Report of the Agricultural Society of Maryland, instituted for the purpose of determining the relative value of the two methods of feeding. We subjoin the statement: it speaks for itself.

"On the first day of December four shoats of the same breed, nearly of a size, and as much alike in every respect as could be selected from a herd of ninety odd hogs, were made choice of; each carefully weighed, and placed in a single stye where their food could be exactly regulated. They weighed between eighty-one pounds and one hundred. The two whose weights together made one hundred and eighty-five pounds, were fed on one gallon of shelled Indian corn, weighing seven pounds to each, for every twenty-four hours, and as much water as they wanted. This quantity of food was sufficient for them; generally they about consumed it. Some five or six different days between the 1st of December and 4th of January, the time the experiment was going on, they did not eat their whole allowance.

For the two shoats, whose weights together made one hundred and seventy-three pounds, seven pounds of good Indian corn meal, by measure ten pints, were made into good mush, or hasty pudding, and divided between them for every twenty-four hours. That is, these two had allowed them exactly half the weight of meal which the others had of raw corn. The seven pounds of meal were daily mixed with scalding water, and then well boiled; the whole process of cooking was done on an average in one hour and a half. They were all fed twice a day and at the same time. The evening feed of the shoats fed on mush was generally warm—the morning feed, having stood all night, was generally cold. The seven pounds, or ten pints of meal, when cooked, weighed an average of thirty pounds, and measured an average of three gallons. There was a difference of nine pounds in the weight of the latter pair—the smallest had the least appetite, and his allowance of fifteen pounds of mush was just as much as he appeared to want or would eat up clear; the other was greedy, and always sharp set, despatched his mess quickly, and wanted more.

Before the experiment had progressed a fortnight, there was a very perceptible difference in the appearance of these pigs. Those fed on the mush assumed a more thrifty, healthy, fresh appearance, particularly of their hair, and this difference appeared more striking as the experiment advanced.

On the 4th of January, while preparations were making for killing and dressing, they were again weighed on the hoof. One of those then whose daily allowance had been seven pounds of corn each, had increased twenty pounds in the twenty-four days: the other, which had had an equal allowance of corn, had increased only five pounds. I could not account for the difference by any thing I could discover, either before or after killing; the appetities of these two were much more alike than of the others; and their health was apparently equally good.

Of the pair fed on mush, whose daily allowance had been three pounds and a half of meal each, the greedy one had gained twenty-three pounds and the other twenty-one pounds.

These are all the material facts in these experiments, except that a very small portion of salt was put in each mess of mush—and there is no miracle in them. The hogs allowed three pounds and a half of each gained less than three-fourths of a pound daily, but it was more than those fed on double that quantity of corn gained."

The plan of making *hogs work*, as adopted by Mr. PHINNEY, and many others, is an admirable one. The manure they produce is of the best kind, and with judicious management large quantities may be easily obtained. Mr. PHINNEY says:

On a large farm, where much green herbage is produced, and where the value of the manure is taken into account, I consider the pigs killed at the age of fifteen or sixteen months as giving the greatest profit. When it is intended to kill them at this age, they may be kept on more ordinary and cheaper food for the first ten or twelve months, or till within four or five months of the time of killing. The manure they make more than pays the extra expense incurred in keeping them the longer time; but spring pigs which are to be killed the ensuing winter and spring must be kept upon the best of food from the time they are taken from the sow until they are slaughtered.

William Penn Kinzer, Springlawn farm, Lancaster county, Pa., in an interesting paper, communicated to the Editor of the Farmers' Cabinet, says:

The conviction, that very much of the nourishing property of grain is lost by the process of fermentation and distillation, and yet aware of the aptitude of all kinds of stock to fatten on the swill of distilled grain, after the essence or volatile spirit has been extracted, I conceived the plan of *boiling* the grain, after being chopped, to be fed sweet and fresh; conjecturing that a given quantity of grain thus prepared would be converted into the greatest possible weight of flesh.

He here gives his process of boiling, and then says, "by this method, cattle and hogs are fattened in half the time that is required on raw grain, and with an economy of grain astonishingly great. * * * My fondest hopes are more than realised."*

All the varieties of grain, and almost all kinds of roots are now extensively used in the fattening of swine, but in general undergo the previous process of cooking in some shape or other. The potato, sugar-beet, ruta-baga, mangel-wurtzel, parsnep and carrot are severally brought into profitable requisition.—Apples, both sweet and acid, afford a very agreeable food for swine; and large numbers are fattened almost entirely upon them with the addition of a small portion of prepared grain for a few weeks previous to slaughtering them. Harvey Baldwin, of Hudson, Ohio, has adopted this process of fattening with marked success, since 1833. Pain Wingate, a practical farmer and a highly respectable member of the Society of Friends, says, "I last year fattened an old hog and two pigs upon apples, with the addition of fourteen bushels of oats and pea-meal, and one bushel of Indian meal. When I commenced feeding them, which was the 10th of 8th month, 1835, they were in rather poor condition. I fed the pigs three months, and they weighed at seven months old, one hundred and thirteen and one hundred and twenty-five pounds. The hog I fattened four months, and when he was nineteen months old he weighed four hundred and fifteen pounds." My old and worthy friend David Comfort, of Byberry, assures me that he has every confidence in fattening hogs on apples, and that he has put up pork fattened on apples until the two last weeks, when corn was substituted; and the pork was as sweet, solid, and well flavored as any he ever saw. Innumerable instances could be adduced of the value of apples in the feeding of swine, but these are deemed sufficient.

Judge Peters recommended the presence of some dry rotten wood in the pens in which hogs were put up for fattening; that their food be soured by a proper degree of fermentation; and that the superiority of swill so acidulated, for fattening, is as one gallon of the sour swill to two of the sweet. "Charcoal or rotten wood, containing a large quantity of pyroligneous acid, should be kept constantly in the pen; and salt should be placed within reach of the hogs twice or thrice every week."

The Farmer's Assistant very judiciously remarks, that whatever method may be adopted for fattening swine, it is essential that they be kept warm and clean. They should be well littered, and as much substantial food and drink as they require should be administered to them at regular intervals or periods. They should be frequently curried; and in every stye or yard in which pigs are kept there should be erected a rubbing-post, the advantages of which are too apparent to need any notice.

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* Care must be observed in selecting the kettle or boiler; iron is preferable, as it is well known that copper, or copper and lead, are highly pernicious, generating poison. Whenever, therefore, boilers of this description are used for the cooking of food, of whatever kind, they should be immediately emptied, and instantly cleansed.

When rearing swine a small quantity of nutritious food given with lucern, clover, tares, &c. is sufficient; but when put up to fatten, a constant supply of the most wholesome and nutritious food should be provided.

ON RAISING SWINE,

AND THE BEST METHODS OF FATTENING PORK.

FROM THE FOURTH REPORT OF THE AGRICULTURE OF MASSACHUSETTS.

BY HENRY COLMAN,
Commissioner for the Agricultural Survey of Massachusetts.

SWINE form a considerable portion of the live stock of Middlesex county. Though Middlesex is not a hog-raising county, yet such is the number of swinish emigrants into it, and the respectability of the condition to which they are advanced after their arrival, that I might be liable to the charge of some Jewish prejudice if I passed them over in silence. Some years since, at a Brighton Cattle Show, an accomplished scholar, then a professor of Harvard University, and afterwards Governor of Massachusetts, whose wit was always racy, and when let out, sparkled and bubbled like a soda fountain, in toasting the farmers of Massachusetts and the literati of her college, expressed a wish that their *pens* might equally do them honor. Without disparagement to the other side of the house, this wish I may say, in respect to the farmers of Middlesex, seems accomplished.

Large numbers of swine are brought into this county for sale. These come mainly from the state of New York. Until within a few years, a breed known as the Grass-fed hogs, constituted the principal stock. This was a hog, raised with little other feed than clover pasturage for the first six months, of a white color with black patches sprinkled over him, long and well formed, of good thrift, and who, with good keeping, at eighteen months old, was easily brought to 400 and 500 pounds weight. Within the last few years the Berkshire hog has been introduced. His symmetry, thrift, cleanliness, fineness of bone, his excellent shoulders and hams, and, above all, his good humor and his marked deficiency in the organ of tune, secured universal favor. In my visits among the farmers since the introduction of this race, I have been amused with their enthusiasm for their swine, resembling that of parson Trulliber, in Fielding's History of Joseph Andrews; and in finding them, I had almost said, more proud of their Berkshire pigs at their troughs, than of their chubby and rosy-cheeked children round their supper-tables. I am a great admirer of the Berkshire swine, but I could never sympathize in these preferences; and my respect for human nature has considerably increased since the progress of the blessed Temperance reformation, and since men are now seldom seen as formerly with all rationality extinguished, and even their animal nature outraged and degraded.

We have been compelled, however, in this as in many other cases, to witness the capriciousness of public favor; and to adopt, with the variation of only a letter, the familiar proverb, and say in this case, that "every *hog* must have his day." The popularity of the Berkshire swine is on the wane. It is objected to them by many farmers that they are not large enough, though they are easily made to reach, at fourteen months old, 300 or 350 lbs.; and further, that they do not cut up well; and that the fat on their backs and sides is not thick enough, especially for packing down for fishermen, who would be glad to have their pork all fat, and whom I have seen spread their uncooked salted fat pork, as landsmen spread butter, on their bread.

The former objection is not made by all persons, as many would prefer for their tables the pork of a hog weighing 300 lbs. to that of hogs weighing 600 lbs., of which I have seen many in our market. With respect to the latter objection, I was half disposed at first to consider it a mere caprice, but that E. Phinney, of Lexington, a farmer in this matter "not unknown to fame,"—and another most respectable farmer of Franklin county, admit that there is some truth in it; and they, as well as many others, prefer a cross to the pure blood. The impression is becoming general, and the butchers in Quincy market are unanimous in their unfavorable opinion of the Berkshire hogs. They admit that their hams and shoulders are good for bacon; but their backs, where they most require it, have no depth of fatness, and they are therefore unsuitable for salting. They are good breeders and nurses. They may be kept, therefore, to much advantage where the object is to raise roasting pigs for the market. This is sometimes quite profitable where a sow has two litters a year. A roast pig, only weaned by the knife, has from time immemorial been deemed a most luxurious dish. So it is likely to continue to be. Charles Lamb says that the Chinese never knew the lusciousness of a roasted pig until an accidental fire occurred which destroyed a pig-stye with its inhabitants. In pulling the bodies of these poor creatures burnt to a crisp from the fire, some of the skin or flesh adhered to the fingers of the Chinese, and in putting their hands by chance to their mouths, they for the first time in their lives inhaled the odor and tasted the deliciousness of the roasted skin. After that the *accidental* burning of pig-styes became so common that the civil authorities were compelled to interpose.

It is but just, however, to the Berkshires to say, that the unfavorable impression in regard to them, though general, is not universal.—An intelligent and very exact farmer at Braintree, B. V. French, has found them to answer his expectations. Upon recently killing a number, he was well satisfied with their appearance, and is of opinion that much of the prejudice which exists against them belongs properly to the impure but not to the genuine race.

The introduction of the Chinese hogs into this country and into

England seems to have been the foundation of all the extraordinary improvements which have taken place in this race of animals—improvements which, within less than half a century, have doubtless enriched the state of Massachusetts many hundreds of thousands of dollars, and the country by millions. The effects of this cross with other swine have been to give fineness of bone, plumpness and fulness of form, extraordinary thriftness, and quietness of demeanor. The old race of hogs, seemed to be of the wolf species in temper as well as condition, and were the personification of ugliness and rapacity. The first introduction of one of these animals into a secluded part of Scotland, within the last century, is matter of comparatively modern history. Having got loose from his stye, he appeared to the terrified imaginations of these simple people as the archfiend himself, and crowds hovered together through fear—the parish schoolmaster being at their head with an open bible, to endeavor to lay this evil spirit! The animal now, in his improved condition, is regarded as one of the farmer's best friends; he eats what nothing else will eat; he is a general scavenger, and an excellent composter of manure. His own manure is one of the most enriching substances which can be supplied to the soil, though not one of the most lasting in its effects; and his flesh is the most frequent dish upon the farmer's table. This county may boast of great improvements in their swine.

A Mr. Mackay, of Boston, owning a farm in Weston, obtained from abroad, some years since, a valuable hog, whose natural good qualities by good management he greatly improved. Some of this breed of swine have been most remarkable for thrift and weight. Besides this, a hog called the Mocho hog, long, round and thrifty, whose pedigree is not known, has been introduced here. Some of the best hogs which I have seen have been from an admixture of these three bloods. Mr. Phinney emphatically approves this cross; and the weight of his swine when killed, of some of which I subjoin an account, establishes the soundness of his judgment.

In 1840, Mr. Phinney sent the following hogs to market:

FEBRUARY 6.

1 weighed 407 lbs.	3 weighed 413 lbs.	5 weighed 364 lbs.
2 " 414 "	4 " 305 "	6 " 366 "

FEBRUARY 15.

1 weighed 469 lbs.	2 weighed 367 lbs.	3 weighed 362 lbs.	4 weighed 331 lbs.

FEBRUARY 17.

1 weighed 763 lbs., 20 months old.	5 weighed 475 lbs., 12 months old.
2 " 591 " 15 " "	6 " 465 " 12 " "
3 " 476 " 15 " "	7 " 430 " 12 " "
4 " 430 " 12 " "	8 " 464 " 12 " "

In 1841, the subjoined is a list of fifteen Berkshire and Mackay hogs from the same farm.

FEBRUARY 22, 1841.

1 weighed 738 lbs.	1 weighed 528 lbs.	1 weighed 487 lbs.
2 " 655 "	2 " 523 "	2 " 480 "
3 " 579 "	3 " 517 "	3 " 476 "
4 " 574 "	4 " 503 "	4 " 441 "
5 " 556 "	5 " 501 "	5 " 400 "

The grass-fed hogs, which I have before mentioned are regaining their popularity. They have been, to a degree, crossed and intermixed with various valuable breeds in the interior, and are now preferred to all others in the Brighton market. With good care and keeping, at fifteen and eighteen months old they are easily carried to 500 and 600 lbs.

Of four, fatted by Stephen Morse, of Marlborough, the current season, the weight was as follows: 539, lbs., 530, 506, 459—averaging 508½ lbs. each. These hogs were put into the stye in September, 1840, weighing between 70 and 80 lbs. each, and were killed in October 1841. They were kept mainly upon boiled potatoes the first winter, and since that, upon the slops of the dairy, skim milk, butter milk, whey and Indian meal.

Some of the best hogs which I have ever seen have been fatted at the slaughtering establishment of Jesse Bird, in Watertown. He keeps his swine about six months. He purchases the grass breed above mentioned, preferring hogs with a small head, round full body though not deep belly, and with full shoulders and broad backs. They are taken in, weighing from 170 to 200 lbs. kept in the slaughter yard for a time, and, previous to killing, are fed upon potatoes and Indian meal cooked, and are brought to weigh from 450 to 600 lbs.

At the slaughtering establishments in the vicinity of the capital, large amounts of pork are supported and fatted upon the offal. Sometimes this is cooked for the swine; in other cases, it is given in its raw state, so that without any troublesome change in the way of preparation, the hogs eat the cattle and then men eat the hogs. It is easy but not agreeable to imagine in such cases what the pork may be. The richness of animal food becomes thus a little too much concentrated even for the epicurean palate; and few persons knowingly would have the courage to touch such food when coming directly from the slaughter-yard, excepting some, who are cannibals by nature, and by some accident have been misplaced in a civilized country. It answers very well for shipping pork, for no questions of taste are ever held over a barrel of provision either on a slave plantation or at sea. It is ascertained, however, that in fatting swine, some portion of animal food and pot liquor is highly conducive to thrift. In the best establishments, the hogs some time before being slaughtered, are put upon vegetable food, potatoes, Indian meal, &c., so that the rankness of the pork is taken away.

E. Phinney's swine establishment at Lexington, is among the most extensive in the county. His number of fattening swine averages about 100, with fifty store hogs, and they are killed in February and March, when from 10 to 18 months old, being of the fall and winter litters of the previous year. His pens are well arranged; seldom occupied by more than three or four in a pen. They have a manure yard attached to each pen, into which bog-mud and litter are thrown for their manufacture and compounding, and they have always a dry and comfortable bed. They are fed regularly three times a day. I shall subjoin an account given by himself of his mode of management, which the farmers will read with interest; and shall annex at the end, a sketch of his styes or barracks.

"An inquiry is often made as to the best time of killing, or at what age it is most profitable to slaughter them. On a large farm where much green herbage is produced, and where the value of the manure is taken into the account, the pigs killed at the age of 15 or 16 months, give the greatest profit. When it is intended to kill them at this age, they may be kept on more ordinary and cheaper food for the first 10 or 12 months, or till within four or five months of the time of killing. The manure they make and the extra weight of pork more than pay the expense incurred in keeping them the longer time; but the spring pigs, which are to be killed the ensuing winter and spring, must be kept upon the best of food from the time they are taken from the sow until they are slaughtered.

The older class of pigs, for the first ten or 12 months, are kept principally upon brewers' grains, with a small quantity of Indian meal, or rice, ruta-baga, sugar-beet, &c., and in the season of clover, peas, oats, cornstalks, weeds, &c., they are cut green and thrown into the pens; the next four or five months before killing they have as much Indian meal, barley meal or rice, with an equal quantity of potatoes, apples or pumpkins, as they will eat, the whole being well cooked and salted, and given to them about blood warm. During the season of fattening, an ear or two of hard corn is every day given to each pig. This small quantity they will digest well, and of course there is no waste. Shelled corn soaked in water made as salt as the water of the ocean for 48 hours, with a quart of wood ashes added to each bushel and given to them occasionally in small quantities, greatly promotes their health and their growth. Their health and appetite is also greatly promoted by throwing a handful of charcoal once or twice a week into each of their pens. Their principal food should, however, be cooked thoroughly and nicely. From long practice and repeated experiments, I am convinced that two dollars' worth of material well cooked, will make as much pork as three dollars' worth of the same material given in a raw state.

"Pigs when first taken from the sow should be treated with great care, to prevent them from scouring and becoming stinted; when either of these happen, it will require many days and sometimes weeks to put them again into a healthy, growing condition. When first deprived of the maternal food, a little new or skim milk, boiled and slightly salted and given to them often and in small quantities, will prevent scouring and greatly promote their growth. If intended for killing at the age of 9 or 10 months, they should be full fed all the time and kept as fat as possible. If on the other hand, they are intended for killing at the age of 15 or 18 months, they should not be full fed, nor be made very fat for the first 10 or 12 months.

"To satisfy myself of the benefit of this course, I took six of my best pigs, eight weeks old, all of the same litter, and shut them in two pens, three in each. Three of these I fed very high and kept them as fat all the time as they could be made. The other three were fed sparingly, upon coarse food, but kept in a healthy, growing condition, till within four or five months of the time of killing, when they were fed as high as the others. They were all slaughtered at the same time, being then 16 months old. At the age of 9 months the full-fed pigs were much the heaviest, but at the time of killing, the pigs fed sparingly for the first 10 or 12 months weighed, upon an average, fifty pounds each more than the others.—Besides this additional weight of pork, the three "lean kine" added much more than the others to my manure heap. These results would seem very obvious to any one who has noticed the habits of the animal. In consequence of short feeding, they were much more active and industrious in the manufacture of compost, and this activity at the same time caused the muscles to enlarge and the frame to spread, while the very fat pigs became inactive, and like indolent bipeds, they neither worked for their own benefit nor for that of others.

"For the purpose of increasing my manure heap, my pens are kept constantly supplied with peat or swamp mud, about three hundred loads of which are annually thrown into my styes. This, with the manure from my horse stable, which is daily thrown in, and the weeds and coarse herbage which are gathered from the farm, gave me about 500 cart loads of manure in a year.

"On regular and systematic feeding and clean and dry bedding, the success of raising and fattening swine very much depends. A faithful feeder, also, who has some skill and taste, and withal a little pride of vocation, is indispensable."

Of all articles ever given to fatting swine, Indian meal is, without doubt, the most nutritious.

Mr. Phinney, it seems, has by actual trial, settled a much vexed question, whether hogs should be forced by full feeding when young, or at first be only kept well in a growing state. He found it better, when designed to be kept more than a year, to let the young animal, by sufficient but not excessive feeding, have time to develop himself and acquire a natural size, rather than, by filling him to repletion, to bring on a premature state of fatness, which seemed to check the growth. To young pigs, milk, whey and butter-milk are the best of all feed; but where cows are kept for the purpose of supplying the market with milk, the pigs will be of course regarded as very poor customers. "The milkman will not call."

The establishment of J. P. Cushing, Watertown, for keeping and fatting swine, is upon a large scale, and is exceedingly well contrived for his situation. It consists of a long one-story building, with separate pens on one side extending the whole length, each designed for four swine, with an open yard and a lodging and eating room to each, besides some lying-in apartments.* A commodious passage-way runs the whole length of it, with the troughs projecting into the passage-way, and a shutter for the troughs so contrived that the trough is easily cleaned at any time, and the food of the hogs is placed before them without admitting that which, in the usual slovenly mode of feeding, is but too common, an uncivil interference on their part before all is ready. Some contrivance as effectual as this for another class of animals would be quite useful at some of our public hotels and steamboats, and save us from the severe remarks of those foreign travelers who have little sympathy with our customary despatch of business, and seem to look upon us as a nation of fire-eaters.

The cooking apparatus is at one end. Had economy of room and ease of feeding been studied, the building might have been double the width, with pens on each side. In England, they are sometimes made circular with the cooking apparatus in the centre and the feeding troughs all within the circle; but in such cases there must be much waste of room. Mr. Cushing's barracks are lengthwise of his cattle-yard, so that the manure from the pens of his swine is thrown immediately into the yard, and any litter or muck easily supplied in the same way. His store hogs, too, at pleasure may be turned into the cattle-yard with the advice given in Æsop's fable by the dying father to his sons, "that there is a treasure buried in the field which they would find by digging for it." The swine however do not much need the advice. They are natural philosophers, and go by instinct into deep investigations. Some of them should always be kept in barn-yards and cellars. They are of great use in turning up and mixing the manure; and in yards where cattle are fed upon grain, and the sweepings of the barn floors are thrown out, they take care that nothing is lost. I have known a considerable number of store hogs kept in a thrifty condition upon that only which they obtained in a yard where a proportional number of beef cattle were stall-fed. The philosophy of reciprocal uses, which is apparent in every department of nature, though it frequently presents itself in a form offensive to a fastidious taste, is to a reflecting mind always instructive on the wonderful economy of the divine providence.

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* The length of this building, including the cooking place, is 252 feet, width 12 feet, and height the same. There are twenty pens, each 12 feet by 8, and a yard of 12 feet attached to each pen. The number of hogs that can be accommodated depends upon their sizes,—from three to six, say an average of four of 300 weight each. There were fatted fifty-two hogs last season, weighing, dressed, 15,573 lbs.

The question of profit in keeping and fattening swine has been much discussed, and so much depends on circumstances of age, breed, food, length of time kept, and price in the market, that the question must remain open. Mr. Phinney gives it as his opinion that with Indian corn at one dollar per bushel and potatoes at 33 cents, and price of pork 12 cents, they may be fatted to a profit. In his experience, he says, four quarts of Indian or barley meal with an equal quantity of apples, pumpkins, potatoes or roots cooked, will give two pounds of pork.

A small example of fatting swine in Medway, Norfolk county, which came under my notice, seems worth recording, because an exact account of their cost was kept. The owner was a mechanic and bought every article of their feed, not even keeping a cow.—His two hogs when killed weighed, one 420 lbs.—one 382 lbs., and pork was then worth 12 cents per lb. Value when dressed, $96 24. They were killed at 14 months old. They were bought in November and killed in the December of the next year. They were kept in the stye the whole time; were fed three times a day with weeds, corn, and potatoes. The potatoes were boiled and the Indian meal mixed with them into a mash. They were fed exclusively on corn one week before being killed. They did as well in winter as in summer. Salt was frequently given to them in their swill. The price of corn bought for them was 117 cts. to 136 cents, on an average of 130 cents per bushel. Potatoes were 30 cents per bushel. The whole cost of the hogs when fattened was $62, including the price of purchase, or 7.8 cents per lb.

I shall here subjoin some careful experiments made by myself a few years since in relation to this subject. They were given to some portion of the public at the time, in another form; but they may here reach many by whom they have not been seen, and to whom they may be interesting.

Experiment 1. Two hogs about one year old; one of them a barrow in very good condition; the other a barrow recently gelded and in ordinary condition, were put up to be fed exclusively upon Indian hasty pudding or Indian meal boiled with water. We began feeding them the 1st of March, 1831, and weighed them again on the 19th of the same month. In the eighteen days they consumed six bushels of Indian meal. They were offered cold water to drink but did not incline to take any. The result—

No. 1 weighed on 1st March,	233 lbs.
" " 19th "	269
Gain,	36

No. 2 (recently gelded,) weighed on first March,	190
“ “ 19th March,	247
Gain,	57

The gain of the two was 93 lbs. in 18 days. The quantity of meal consumed by them was 10 quarts per day to the two. We allow 30 quarts to a bushel, deducting two for grinding. The price of corn at the time was 70 cents per bushel. The expense of the increase weight is 4.5 cents per lb.

March 21, 1831. Killed the hog mentioned first in the foregoing experiment. Live weight 273 lbs. Weight when dressed 215 lbs. Loss in offal, loose fat included, 58 lbs. or a little more than one fifth.

Experiment 2.—No. 2, mentioned above weighed

On 23d March,	253 lbs.
On 30th April,	312 “
In 28 days, gain	59 “

No. 3, a shoat purchased from a drove, weighed

On 28th March,	100 lbs.
On 30th April,	151 “
Gain in 33 days,	51 “

This is a fraction over 1 lb. 8 oz. per day each, nearly 1 lb. 9 oz.

In this case their food was exclusively boiled potatoes mashed with Indian meal. The exact amount consumed not ascertained, but fed as freely as they would bear.

Experiment 3.—The two last-named hogs were for the next 20 days put upon Indian hasty pudding exclusively, with the following result:

No. 2 weighed on 30th April	312 lbs.
“ “ 20th May,	382 “
Gain in 20 days,	70 “
No. 3 weighed on 30th April,	151 lbs.
“ “ 20th May,	185 “
Gain in 20 days,	34 “

The two in the above named 20 days, consumed four and one-half bushels of meal, cooked as above. Meal 78 cents per bushel. Gain of the two, 104 lbs. in 20 days.

Experiment 4.—Sundry swine purchased from a drove, and fed with meal and potatoes, washed and mashed—

From 28th March, 1831, to 19th May, 1831.

No. 1	weigh	97 lbs.—	165 lbs.	Gain in 52 days,	68 lbs.
2	“	134 “	182 “	“ “	48 “
3	“	100 “	186 “	“ “	86 “

The two following, raised on the farm, and fed as above—

No. 4	weighed	151 lbs.—	206 lbs.	Gain in 24 days,	55 lbs.
5	“	140 “	165 “	“ “ “	25 “

Experiment 5.—In this case it was not intended to force their thrift, but to keep the swine in an improving condition. They were shoats of the last autumn, and were of a good breed.

Tuesday, 3d April, 1833. Put up four shoats, and began feeding them with Indian hasty pudding.

	3d April,	22d April,		25th June,	
No. 1,	176 lb.	202 lb.—	Gain 25.	264 lb.—	Gain 62
2,	119 “	153 “	“ 34.	226 “	“ 73
3,	150 “	170 “	“ 20.	218 “	“ 48
					[Total, 183 lbs.
4,	121 “	145 “	“ 24	killed 30th May.	

From 3d April, to 22d April the above swine consumed seven bushels and one peck of Indian meal. From 22d April, to 25th June, seven bushels of Indian meal, cooked as above.

One of the above, No. 4, was killed on 30th May ; being absent, the live weight was not ascertained.

On the 25th June, the three remaining hogs were weighed, and in the 63 days from 22d April to 25th June, they had gained in that time 183 lbs. as above.

After 30th May, when one of them was killed, one peck of meal made into hasty pudding with a small allowance of the waste of the kitchen for a part of that time, lasted them three days, that is 22.25 or less than a quart, say ⅞ of a quart per day to each.

At first we employed half a bushel of Indian meal to make a kettle of hasty pudding ; but we soon found that a peck of meal by being boiled sufficiently would make the same kettle nearly full of hasty pudding and of sufficient consistency. The kettle was a common-sized five-pail kettle, set in brick work in the house ; and it was remarkable that the peck of meal produced nearly the same quantity of pudding, that we obtained from the half bushel, which showed the importance of inducing the meal to take up all the water it could be made to absorb.

The price of Indian corn was at that time 75 cents per bushel—30 quarts of meal to a bushel deducting the toll. The amount of meal consumed in the whole time from 3d April to 25th June was 14¼ bushels—the cost $10 69—the total gain, making no allowance for the gain of No. 4, from 22d April to 30th May, which was not ascertained, was 287 lbs.

The gain of No. 1, 2 and 3, from 22d April to 25th June was 183 lbs. in 63 days ; and allowing one peck to serve the three hogs for three days, required 5¼ bushels, the cost of which was $3 94. The live weight could not be estimated at less than 4 cents per lb. when pork was at market 6 cents.

The value of the 183 lbs. therefore was equal to $7 32, or at 5 cents to $9 15 cents.

The gain of the swine for the first 19 days, from 3 to 22d April was

No. 1, 26 lbs. or 1.368 per day.
2, 34 “ or 1.789 “
No. 3, 20 lbs. or 1.052 per day.
4, 24 “ or 1.263 “

The gain from 22d April to 25th June, 63 days, was

No. 1, 62 lbs. or 0.984 per day.
No. 2, 73 lbs. or 1.158 per day.
No. 3, 48 lbs. or 0.761 per day.

The difference of daily gain in the two periods was attributable to the diminished quantity of meal. The question then arises, whether the first mode of feeding was as economical as the second.

In the first 19 days, 7 bs. 1 peck consumed, gave 104 lbs. gain.
In the next 63 days, 5 bs. 1 peck consumed, gave 183 lbs. gain.

Had the first gain been in proportion to the second gain in reference to the meal consumed, the 7¼ bushels which gave 104 lbs. should have given 252 5-7 lbs. This great disparity can be explained only in the more economical preparation of the meal, by which a peck, taking up as much water as it would contain, gave a kettle nearly full of pudding, when half a bushel of meal, imperfectly prepared, gave little more. This seems to demonstrate the great advantage of cooked food, both as it respects its increase of bulk and the improvement of its nutritive properties. Whether it would apply to those substances, whose bulk is not increased by cooking, equally as to Indian meal and the like, is a matter which experiments only can determine.

Such are some few trials in reference to the feeding and fattening of swine, which I have made, or information of which I have obtained from other sources, which may at least lead the inquisitive farmer to further experiments and inquiries, on a subject of great importance to his interest. The inferences to be made from them I shall leave to others. The results, as will be observed, are not uniform. The thrift of animals must depend on various other circumstances besides the kinds or the quantity of food given them. Much depends on the breed, as every farmer knows; much on the health of the animal; something on the season of the year. I failed in attempting to fatten several swine in one case, though they were carefully attended and various kinds of feed were tried, and the failure was totally inexplicable until they were slaughtered, when the intestines were found corroded with worms, resembling those found in the human stomach, and this, I have no doubt, prevented their trift. The same fact has occurred in another instance, and with the same result. I failed in attempting to fatten some other swine, who had been driven a considerable distance and exposed, probably not even half fed on the road, to severe cold and storms. Some of them were frost-bitten in their limbs; and though attended and fed in the most careful manner they made no progress for months. In an experiment recently made, of giving swine raw meal mixed with water, I have found a falling off in their gain of nearly one half, compared with giving their food cooked, such as boiled potatoes and carrots, mixed with meal while hot; the result being, in a stye containing a number of swine, as 279 to 500. In respect to confinement or freedom, various opinions are entertained. The Shakers at Canterbury, N. H., deem it indispensable to the thriving of their swine that they should have access to water to wallow or wash themselves in; and that they by no means do so well without it. On this point I have had no trial further than to satisfy myself that fattening hogs are sometimes injured by being suffered to root in the earth.

With respect to the age at which it is advantageous to put up swine to fatten, I have only to remark, that it is with swine as with other animals, there are some breeds which come much sooner to maturity than others. A successful farmer in Saratoga county, N. Y., says that March pigs, killed about Christmas, are the most profitable for pork. Four pigs, of what is called the grass breed, were slaughtered at Greenfield, N. Y., which weighed 384 lbs. 318 lbs. 310 lbs. and 306 lbs. at nine months and seventeen days old.

On this point, I present a letter with which I was honored by the late John Lowell, whose authority in the agricultural community is justly estimated.

"Dear Sir,—I have been prevented answering your inquiries as to my experience in raising old or young pigs. I may say that I have fully and clearly ascertained, from a trial of twenty years, that young pigs of from 25 to 30 lbs. will give nearly double, in some remarkable cases three times, as many lbs. as shoats of six months weighing from 100 to 150. I have taken two pigs of 100 lbs. each, age six months, and never was able between May and November, to get them above 180, rarely above 170. I have taken three pigs, of about 30 lbs. each and on the same food which I gave to the two, they would weigh from 170 to 180 each in the same period ;—nay I have taken pigs of 200, and never could get them to weigh more than 300 in 7 months, on my food. The way I ascertain the quantity of food is, that I never give any thing but the produce of my dairy, and the refuse of the garden, peaches, apples, and cabbage, which are uniform generally.

3 pigs of 90 wt. or 30 wt. each, will give, ordinarily, - - -		510 lbs.
	less original wt.	90 often
not more than 60. - - - - - - -		
	gain	420 lbs.
2 pigs of 100 wt. each, will give, ordinarily, - - - -		340 lbs.
	less original wt.	200
	gain	140

"But the 3 pigs of 90 will not consume for the first three months half so much as the two of 100 each, and I have kept a fourth and sold it in August for quarter pork.

"There is nothing new or remarkable in these facts. It is the law of the whole animal creation. It is true of the calf and man. The child of 7 lbs. quadruples its weight in 12 months; and the calf of 60 wt. if fine and well fed, will weigh 600 wt. at the end of the year, and (if a female) will not double the last weight at any age.

"P. S. It should be remarked that the weight at purchase is live weight, and at sale dead or net weight, because in truth, to the owner this is the true mode of considering the subject. No doubt my sort of food is peculiarly favorable to young animals, it consisting in very liberal allowance of milk. If the older pigs were at once put on Indian meal, they would attain to 250 lbs. at a year old, but the cost of the meal, at 70 cents per bushel, would amount to 9 dollars, and if the first cost, 5 dollars 50 cents, be added, and the pig sold at 6 cents, there would be but 2 dollars gain on 2 pigs of 100 lbs. each; while 3 small pigs, without meal, fed on milk, would give 24 dollars in the same time. I do not mean to give minute details but general views. As an important qualification of the foregoing statement, it should be added that shoats of six months, bought out of droves, have usually been stinted in their growth, and animals, like trees, recover slowly after a check. I presume if shoats were taken from a careful and liberal owner, the difference would be less. But as a general law it may be safely affirmed, that weight for weight at the purchase, the younger the animal the greater the positive, and the far greater the net gain. At least such is my own experience and belief."

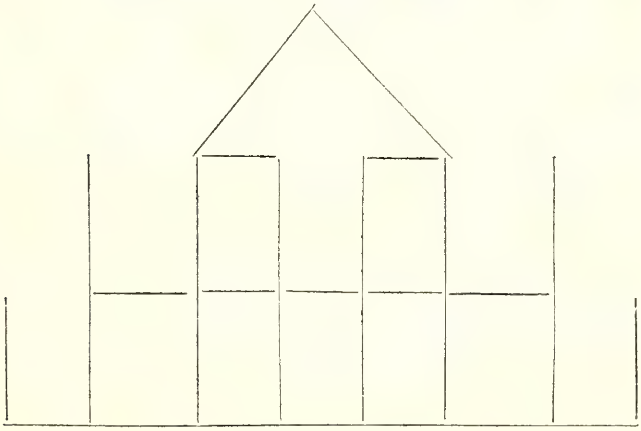
The preceding facts and experiments encourage the belief that hogs may be raised and fattened by the farmer to advantage, where corn is worth 70 cents per bushel, and his pork will bring him 6 cents per pound. Success must greatly depend on skill, care, selection, and good management. The best swine that I have ever found have been in dairy countries, for there cannot be a doubt that milk and whey for every animal are among the most nutritious of aliments. Indian meal probably ranks next, though many farmers prefer a mixture of provender, such as corn, oats, rye, or barley ; but I believe in all cases cooked food will have a decided advantage over that which is given in a raw state ; an advantage more than equivalent to the labor and expense of its preparation. Potatoes are a valuable article of food, but the pork is not so good as that fattened upon corn.—Carrots are more nutritious than potatoes. Corn given in a raw state or on the ear is a most wasteful management.

Swine ought to be kept on every farm in sufficient numbers to consume all the offal and waste of the dairy and kitchen. If beyond this, a breed can be obtained, which will arrive at early maturity, and which can be advantageously grass-fed or kept at a small expense and in an improving condition through the summer ; and being put up to fatten early in autumn and forced as much as possible so as to be sent to market early in the winter, the farmer will ordinarily find a fair profit in this branch of husbandry. A great advantage is found in the keeping of swine from the valuable returns of manure both in quantity and quality, which are obtained from them, where care is taken to supply them with raw materials for the manufacture. Too much care cannot be bestowed in the selection of the breed and the general health of the animal when put up to feed ; and it is strongly recommended to every careful farmer occasionally to weigh the animal and measure the feed, that he may ascertain seasonably on which side the balance of debt or credit is likely to fall. Nothing is more prejudicial to good husbandry than mere guesses and random conjectures, though the result of our operations may not meet either our wishes or expectations, an intelligent mind will be always anxious as far as practicable to know precisely how far they correspond with or disappoint them.

The profit of fatting pork with us has become much more questionable since such vast amounts of salted pork and hams are brought into our markets from Ohio and the far Western States, through the great and constantly increasing facilities of transportation.

This must essentially affect our markets. But it is to be considered that to a certain extent our own pork here will always be preferred ; and that fresh pork, the lean pieces, will always be wanted in our market, with which the Western pork cannot at present come into competition, though after the experience of the last five years, it might be almost rashness to say that our markets may not yet be supplied with roasting pigs and fresh spare-ribs from Cincinnati. Then again there is on every farm a certain amount of refuse and offal, which may be profitably given to hogs, and would otherwise be lost. There is another circumstance, which must go to the credit of our swine. Manure in Middlesex county is every where valued at least four dollars per cord on the farm.—A hog duly supplied with the raw material, for a hog cannot, more than an Israelite, make bricks without straw, will make three cords of valuable manure in a year. A sow well kept likewise, may raise a litter of pigs, and may be fitted for market in the same year. These circumstances may encourage us to think that, in spite of Western competition, a certain amount of pork may be profitably fatted among us every year. It is comparatively a recent discovery that apples are as good for fatting swine as potatoes. This opinion has been expressed to me by many farmers in this county. Apples may be cultivated to an indefinite extent and at a small expense. We may easily avail ourselves of this advantage. The opinion of many of these farmers is, that they are better given raw than cooked. This point will, I hope, be made matter of experiment. The fattening of hogs, however, is subject to so many contingencies, that under present circumstances, excepting where extraordinary supplies of food are easily obtained, upon a large scale it can be safely undertaken only with extreme caution and care. Many, who have undertaken it, have been unsuccessful.

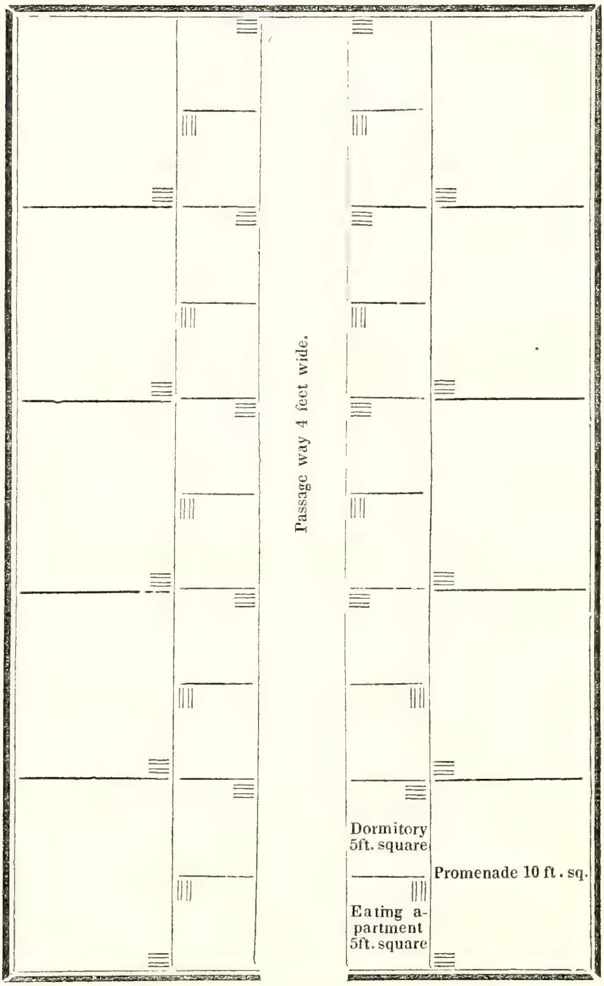
PLAN OF MR. PHINNEY'S HOG STYE.



AN END VIEW.

The roof covers the passage way and eating and sleeping apartments on each side, and is made sufficiently high to enable the feeder to pass between the pens. The floors of the eating and sleeping apartments are made perfectly tight; the floor of the promenade in the upper story is laid with narrow planks, placed about one inch apart, so that whatever is dropped by the pigs falls through on the compost beneath. The promenade of the lower story has no floor. The only passage for passing the pigs out and in, is by a side door between each dormitory and the main passage-way. The pen being on ground which is a little higher at the end where the boilers are placed than at the other, the floor of the boiler-room is on a level with the passage way of the upper story, where the pigs kept in this part of the building are taken in and out. At the other end of the building, the floor of the passage-way in the lower story is on a level with the natural surface of the ground, and by a door at that end of the passage-way, the hogs are taken in and out. You will perceive that a pen 100 feet long and 34 wide, with three in a pen, will furnish ample accommodations for 120 hogs. A passage-way for the feeder is made from the cooking-room to the passage-way in the lower story.

PLAN OF THE FLOOR OF THE UPPER STORY.



The foregoing is a rough plan, which may give an idea of the manner in which my hogs are kept. It is intended for the plan of the upper story on one end. The lower story corresponds with the upper except that the promenade is extended out six feet from the line of the upper outside promenade line.

DISEASES INCIDENT TO SWINE.

Swine are liable to but few diseases; but inasmuch as they are very bad and unruly patients, it is exceedingly difficult to treat them in a proper manner. Fortunately, however, a system of proper management, a regular supply of wholesome and nutritious food, with a due regard to cleanliness, will in general ward off all diseases; and the necessity of attending with the greatest degree of strictness to these matters cannot be too forcibly impressed upon the mind of every farmer.

The garget is an inflammatory affection of the udder; the lacteal ducts, by which the milk is conveyed, being obstructed by an accumulation of coagulated milk; and as young pigs will not suck when the milk of the dam becomes vitiated, the corrupted milk must without delay be expressed gently by the hand. But when this cannot be effected, which is often the case, there is but one alternative—that is, to kill the sow, as she must inevitably perish.

Garget of the maw arises from over-feeding and retained dung, by which the stomach and intestines are greatly distended, with much pain to the animal. *Receipt:*—Give one or two drachms of jalap; repeat, if necessary, administering at the same time a clyster of warm water and common salt.

The measles is a disorder mostly confined to the throat, which is filled with small pustules; these sometimes appear on the outer surface of the neck, and it is found to affect the grain of meat when killed. It is the disease most common to the hog, and is easily recognised by the languor and decline of the animal. It is readily removed by giving small quantities of levigated crude antimony in his food.

Diseases of the lungs are mostly attended by a dry, hard, husky cough, and a wasting of the flesh. As these diseases generally arise from exposure to cold and wet, the best remedy is a warm, dry pen; and their food, which should have a tendency to keep them cool and prevent irritation, should be given to them with regularity, but not in too great quantities.

The murrain or leprosy in swine is known by the shortness of breath, a hanging of the head, staggering, and secretions of viscid matter from the eyes. The origin of this disease is attributed to an inflammatory state of the blood, frequently occasioned by a long continuance of hot weather. *Remedy:* Boil a handful of nettles in a gallon of small beer, then add half a pound of flour of sulphur, a quarter of a pound of pulverized aniseed, three ounces of liquorice, and a quarter of a pound of elecampane. Give this liquid in milk, in six doses, and keep the animal on good wholesome food. Keep your animals cool and clean in summer, and you will not probably be troubled with this disease.

The staggers is a disease to which swine are liable; during its paroxysms they turn round with amazing rapidity, and very often, if relief is not afforded, die in half an hour. The Farmer's Assistant furnishes the following remedy, on the authority of Mr. DE GRUCHY.

On opening the mouth a bare knob will be discovered in the roof of it; cut this away, and let the wound bleed; make a powder of loam and salt, rub the wound with it, and then give the beast some urine, and he will presently recover.

Dry cough and wasting of the flesh is corrected by a warm pen, and a regular supply of cooling and wholesome food.

The mange in hogs, like the scab in sheep, is a cutaneous eruption, brought on by the foul state of the pens or enclosures, and most generally denotes a slovenly farmer. This inference does not always follow: we have known instances in which it has been introduced into our best farms by the purchase of animals having it in its incipient stages, when it could not be detected. It is indicated by the violent rubbing of the diseased animal against any hard substance, and with such violence as to tear away the head of the pustule, and to produce a disagreeable scab. On the first appearance of this disease, the infected animal must be instantly removed to a considerable distance from the others, washed thoroughly with a strong soap-ley, and anointed with the following preparation, recommended by Dr. NORFORD. "Incorporate one ounce of fine flour of sulphur, two drachms of fresh pulverized white hellebore, three ounces of hog's lard, and half an ounce of the water of kali, (as prepared in the shops,) so as to form an ointment." This is to be rubbed in at one time, and is supposed sufficient for a hog weighing from eight hundred to a thousand pounds; and if properly applied, no repetition is necessary, provided the hog be kept perfectly clean after the cure is performed. It sometimes happens that from long neglect, the ears, neck, and other parts become ulcerated. In this case they should be anointed every third or fourth day with a little tar ointment, prepared by mixing equal parts of mutton suet and tar over a gentle fire, and straining the mixture while hot.

Fever, or *rising of the lights*, as it is sometimes called, appears to originate from over feeding, and may be removed by administering a mixture of sulphur and oil.

CURING OF PORK AND HAMS.

This is a very nice process. A great diversity of practice prevails throughout the country. Some sections, as Burlington county, New Jersey, for instance, are justly celebrated both at home and abroad for the peculiar excellence of their hams. Virginia bacon has also obtained great celebrity. As the practice of curing both pork and hams is so various, all we can promise or undertake is to give the different processes adopted by experienced and practical men. The following method has been practised for a number of years by T. W. JOHNSON, Esq., of Auburn, near Frederick, Maryland, with the best results, his hams rivalling in excellence and flavor the Burlington and Westphalia hams. He says:

"In order, then, to have GOOD *bacon*, it is necessary to have GOOD *hogs*. By good hogs I mean those of an approved breed, of proper age and size; much more depends on the breed of the hog than is generally supposed, and much, very much upon the age and size. The most approved breeds for bacon, are the cross of the Parkinson with the Siberian, or the Chinese with our common stock; the meat is more delicate in flavor and taste, and easier to be raised and kept fat. Hogs from fifteen to eighteen or twenty months old, are the best ages; and weight from one hundred and thirty to one hundred and eighty pounds. Hogs of less age than twelve or fifteen months, have too little firmness and solidity to retain their juices, and after smoking become hard and dry; the same objection holds good as to weights under one hundred or one hundred and twenty. Hogs of two hundred pounds or upwards are too thick and large to be thoroughly salted and smoked; consequently difficult to preserve any length of time.

Unless the weather is so cold as to endanger its freezing, the hog, after being slaughtered, is suffered to hang out all night so as to become thoroughly cold and stiff, when it will cut up much more smooth and neat. In cutting up I make six pieces from each hog for salting; the feet should always be sawed off instead of being cut off with an axe or cleaver, as it will leave a smoother surface and prevent any place for the lodgment of skippers. The feet should be cut off a little below the joint. The next and most important matter is the salting. It is almost impossible to find two persons who agree as to the best mode; some use fine, some coarse salt, some cayenne pepper, some sugar, some molasses, some nitre, and some none, and some again prefer brining. But as I have promised to give you my method, I shall proceed to do so. After cutting up my pork. I select my hams and shoulders, lay them side by side, skin down, on some loose planks elevated at one end to permit the blood to drain off freely; they are then salted, or what is called sprinkled with the best clean Liverpool ground alum salt. After remaining in this situation for two or three days, or until they become perfectly white, they are then taken up piece by piece and laid on a clean table; to each ham and shoulder, according to size, I put two tea-spoonsful or more of finely pulverized nitre, rubbing with the hand both the flesh and the skin side; it is then well rubbed with salt and laid in a clean tub—after putting in as many pieces, side by side, skin down, as the bottom of the tub will contain, I fill up all the interstices with salt, then another layer of meat and salt, and so proceed until the tub is full. In four or six weeks, in a good cellar, it will have absorbed as much salt as it ever will; (you see from this remark, I do not believe in over-salting hams and shoulders.)

Ten days or a fortnight, before taking out of the tubs, I have some young green hickory wood cut and burnt by itself, the ashes collected and sifted; after taking the meat out of the tubs and wiping it dry with a clean coarse towel, it is laid in a wooden box sufficiently large to contain two pieces, the hickory ashes thrown over them and well pressed on with the hand; it very soon forms a hard incrustation over the meat and prevents as well evaporation, drying and dripping, and is also one of the best preventives against bugs and skippers. After hanging in the smoke-house for a day or two, the operation of smoking commences, which I continue for three months, or until the first appearance of the *green bottle fly*. My meat is smoked exclusively with green hickory wood; the green oak will answer very well. It cannot be smoked too much, though with the smoke there should be as little heat as possible; the largest pieces should be hung more immediately over where the fire is made. Early in the spring, say the first of April, or earlier, should the weather be warm, or you discover any of those *green coat gentry* about your meat-house door, take down your hams and shoulders and pack them away in your salting tubs, placing between each layer of hams or shoulders, pieces of laths to prevent too much pressure or coming too much in contact, otherwise they will be apt to mould where they press one upon the other. After filling your tubs in this way until about one foot from the top, fill it up with hickory ashes pressed close."

This is Mr. JOHNSON's experience and practice for years past, and in communicating it, he very aptly remarks, that there is "really as much art in *cooking* a ham as there is in curing it." The best ham ever cured may be wholly spoiled by injudicious cooking.

One of the best and most successful farmers of Philadelphia county, recommends the following process, the excellence of which he is fully satisfied of by several years experience. It is still his favorite and only method. For curing pork, two hundred pounds—fifteen pounds of Liverpool salt; eight gallons of pure soft water; one pound brown sugar; four ounces salt petre; one quart ley.* These ingredients are to be mixed with the water *cold*, well stirred and skimmed, and put over the pork cold, no fire being used about the process. The pork is to be packed in a cask, and between each piece sprinkle a little fine salt. Then pour over your pickle, and let it stand until the pork is salted to your taste—usually about four weeks are sufficient. The pork should be rubbed with salt, and laid on shelves long enough to become perfectly cool previous to being consigned to the pickle tub.

Meat that is to be dried and smoked requires less salt than that which is to remain in pickle, on account of the preserving qualities of the pyroligneous acid, which is supplied by the smoke of the wood. The great art in smoking meat well, seems to consist in having the meat dried by smoke and not by heat. The hams of Westphalia, unrivalled in reputation, are managed in this way. The farmers have a closet in the garret adjoining the chimney, made smoke-tight, in which they hang their hams and bacon to dry without the influence of heat or fire. The smoke is conducted into this room through a funnel inserted in an aperture of the chimney. There are two, one for admitting the smoke, the other for passing it off. There are a number of similar establishments in Chester, Berks and Lancaster counties.

The hams of some of the European states are highly extolled. In Germany, Spain, and in some other places they are remarkably fine flavored, and are frequently spoken of by travellers in those countries. A large quantity of sugar is used along with the saltpetre in curing them, which not only aids in the conservation of the flesh, but also renders it peculiarly mellow. In many of the old countries sugar is very generally put into the water in which the hams are boiled, as it found to render them more tender.

The smoked flavor, which by many persons is considered an improvement, may be readily imparted to the hams by rubbing them with the pyroligneous acid, which acts also as a great preservative of all kinds of flesh from putrefaction. It may be had in the shops.

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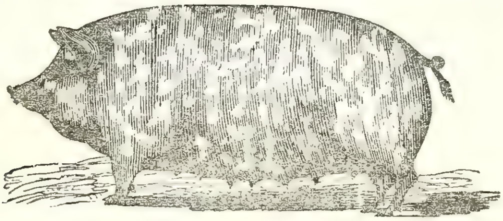
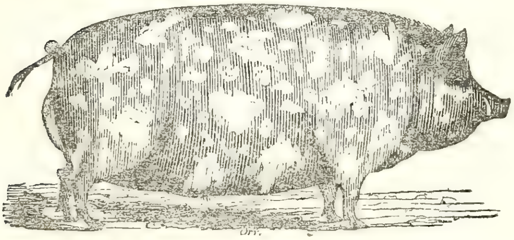
* The same receipt answers for a like quantity of beef, substituting 12 for 15 pounds of salt.

☞ We had intended the preceding page to conclude the section devoted to Hogs, but after it was already passing through the press we obtained several cuts which we are desirous to incorporate in our volume, feeling persuaded that they will add to the interest and value of the information conveyed under this head. The portraits were engraved for A. B. **Allen**, Esq., of Buffalo, New York, who introduced them to the public through the Albany "Cultivator."—We extract from Mr. Allen's communication.

> Below are the portraits of a pair of the improved Chinese in the writer's possession, bred by himself, and faithfully sketched after the originals. They are represented in no better flesh than they will always attain when full grown, running in a common grass pasture during the summer, or with the most moderate allowance of food in the winter.



MAID OF ERIE.



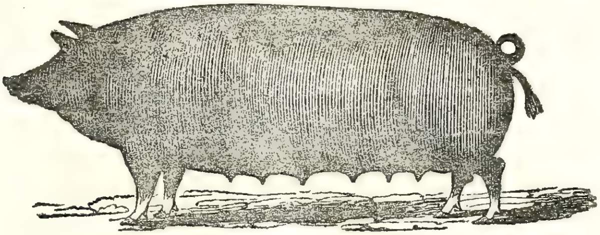
SENECA CHIEF.

> There was a slight mistake in the coloring of the engravings, the spots of black and white in the originals being fewer in number, and of course somewhat larger than here represented. As now bred by the writer, their live weights full grown, are generally from 200 to 300 pounds; occasionally they have gone as high as 400 pounds, but this is extremely rare. They are equally hardy, enduring heat and cold as well as any of the native swine; are fair breeders, usually having from six to nine pigs at a litter; mature easily, and can be fattened at any age. Whether in field or pen, they are ever quiet; the loosest boards keep them up, and the poorest fence secures them

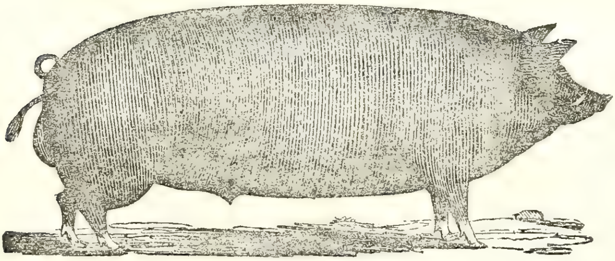
within their bounds; and like Diogenes in his tub, they seem never so happy as when left alone to sleep, and dream, and cogitate on deep philosophy. Their meat is exceedingly delicate and sweet. In England it bears the highest price, and is called par excellence the "gentleman's pork." The improved Chinese will give a greater amount of pork for their food than any other breed in existence; and it is in allusion to this circumstance that the able editor of the Maine Farmer, with no less truth than justice, calls them the "poor man's hog." Boars of this breed are highly recommended to cross with the common hog of the country, as they most rapidly improve the quality of the meat of their progeny, fine their points, give breadth and depth to the carcase, quiet their dispositions, and add a greater tendency to mature quick, fatten kindly, and at the same time increase their sizes.

Many attempts have been made in Europe to improve the breed of the native swine, by selections and otherwise; but so far as the writer has been able to follow them up, there has been little success, and that little very slowly obtained, except only where resort has been had immediately to the Chinese boar. This is particularly the case with England, whose efforts seem to have carried her, in this department, as far beyond her neighbors as in that of the improvement of horses, cattle and sheep. Every county there boasts of its breed of swine, and certainly many are very deserving, having derived their chief excellence from a cross more or less deep with the large white Chinese boar. Of these are the Leicester, the Bedford or Woburn, the Sussex and Cheshire. But the most decided improvement, and which by the care and skill of recent breeders, has now nearly attained perfection, was that of the black Siamese boar upon the old stock of Berkshire county. This, I understand, began about forty years since. The Berkshires were then mostly a long, large, coarse, lop-eared hog, of a sandy or reddish brown, or white, with black spots, and coming up, not unfrequently, to the high weights of 800, and even 1,000 pounds. But it was a slow feeder, long attaining to maturity, an enormous consumer, and in common with most of England's other varieties, an unprofitable beast. Yet possessing rather thicker hams and shoulders than the other kinds, a longer, fuller body, and its meat abounding greatly in lean, the little, short, fat, black mouse-eared Siamese told well in the cross; and thus was produced the dark, splendid Berkshire, that at present occupies the same rank among hogs that the Durhams do among cattle. They mature quickly, and like the Chinese, can be fattened at any age, and still may be selected, when desirable, for great sizes; are prolific breeders and the best of nurses; thrifty, hardy, and of most excellent constitution. They are fine in their points, possessing remarkable thickness in the ham and shoulder, and show a round, smooth barrel of good length, that gives a large proportion of side pork. They have little offal, thin rind and hair, and few or no bristles. The meat abounds still greatly in muscle, and the hams particularly are highly prized, commanding an extra price in market, being very tender, juicy and lean.

As now bred, the Berkshires vary somewhat in size, appearance and maturity. Those with the finest heads, a dished face, and rather upright than forward ears, with a snugger shoulder and ham, and shorter body, most resemble the Siamese ancestor, and therefore are quickest to mature, and probably give the most delicate meat, and to one satisfied with moderate size, are undoubtedly to be preferred. Barrows of this description, if well fed till 18 months old, easily attain 300 to 400 pounds, and weights within these limits are the most eagerly sought for at the Smithfield market, and are probably on the whole the most profitable for both consumer and producer. Others, generally of a straight nose, with a coarser head, and ears protruding well forward over the eye, or slightly lopped, with greater length of body, incline more to the original Berkshires, attain higher weights, and require a longer time to mature. There are individuals, however, occasionally possessing all the fine requisites of the former selections, together with the large size of the latter. Of this class the figures below are supposed to be as fine specimens as any at present in the United States.



RAVEN HAIR.

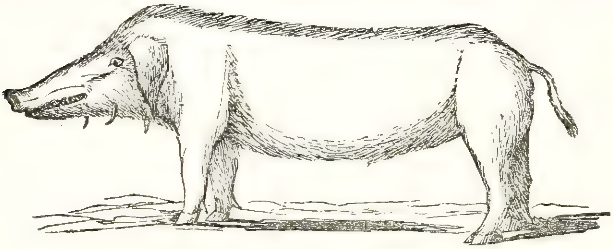


BLACK WARRIOR.

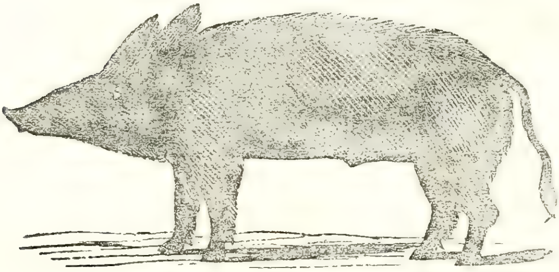
This pair is among the writer's breeding stock, and he believes that he can confidently appeal to the numerous gentlemen who have favored his piggery with a call, to attest to the faithfulness of the portraits. They are not considered fat at all for Berkshires, but merely in good store order, and were two years old last spring. The live weight of the sow is now about 450 pounds, that of the boar 500 pounds. They have never been pushed at all in their feed, but kept steadily along, and when grown, in fair condition, will weigh respectively 600 and 700 pounds at least, and probably something more.

We now come to a pair of fatting barrows of the unimproved breeds of swine. They abound throughout the country, under a variety of most euphoneous names, but we may suppose those of Alligator and Landpike about as appropriate to them as any others that could well be applied. They are not, however, introduced here for derision, or for the purpose of getting up a caricature, as the originals can easily be found; but to show that there is *something in breed*, and to illustrate the difference between a good animal and a poor one of the same variety.

They have long, peaked snouts, coarse heads, thin chests and narrow shoulders, sharp backs, slab sides, steep rumps, and meagre diminutive hams, big legs, clumped feet, with the hide of a rhinocros, and the hair and bristles of a porcupine, and as thick and shaggy as a bear's. How can such animals thrive, and above all ever be fattened? To attempt to make them do either, as the writer found to his cost in his first efforts at farming, were time and money and produce thrown away. They have no capacity at digestion, and concocting their food in the stomach for nourishment; and if they had, to the formation of what would it all go? Pork? No, ineeed—but offal, bones, rind, bristles and hair, with a narrow streak of gristle underneath, and a still narrower line of lean, both as tough and rank as whitleather, and about as incapable of being masticated; and if it were not, must require a vast deal of *larding* to make it sustain human life. I have been obliged to purchase it occasionally for my workmen, and before they could possibly get up a fry for breakfast, twice the weight in lard from other hogs had to be added to it, and as for baking or boiling, one might as well undertake to stew an alligator's hide itself. In disposition, they are like the Ishmaelites of old—their *snouts* are against every man, and every man's *hand* is against them. No reasonable fence can stop them, but ever restive and uneasy, they rove about seeking plunder; squalling, grunting, rooting, pawing, always in mischief and always destroying. Enormous gormandizers, yet never satisfied; but like Pharaoh's lean kine, they lick their jowels for more, and show in their miserable carcases no return for the food consumed. In short the more a man possesses of such stock, the worse he is off, and he had far better sell his produce at any price—yes, even his corn at a dime a bushel, than to put it into such totally worthless brutes.



ALLIGATOR.



LANDPIKE.

THE CONTRAST.

The astonishing power of hereditary opinions, and of impressions received in early education, is attempted to be illustrated, by the following dialogue, supposed to have occurred in an evening conversation, between a farmer of the hereditary school, and his son, on the latter's return from school, where he had studied, with some interest, the principles of scientific farming. LANSINGBURG.

Father—Well, John, since you are becoming a scholar, I suppose you have quite outgrown the thoughts of being a farmer?

Son—No, father, the effect is quite the contrary. I have been paying considerable attention to the study of agriculture; and I assure you I have found it a most delightful subject.

Father—From the number of books and foolish newspapers, all about farming, you have brought home, you are in a fair way to run crazy and turn book farmer—why, son, I would sooner see you engaged in catching grasshoppers.

Son—Then, I suppose, father, you consider farming as not susceptible of any improvements.

Father—Improvements, why what improvements do you want, John? Have not I been a farmer all the days of my life—and a good farmer? and were not my father and grandfather good farmers, brought up to it? and now I have been sending you to school, and on your return home, have commenced teaching me how to farm. No—no—John, that wont do—I am too old to begin to learn my trade anew from books, written by a parcel of lazy fellows, who never hoed a hill of corn in their lives.

Son—Then, I suppose you will plant corn on the same old field behind the barn where you have always planted it, and feed the same breed of long snouted, razor backed hogs?

Father—Yes, John, I have hoed corn in that old field many a day, by the side of your grandfather; and it is good enough for me, yet; and the pork of my old breed of hogs brought me over a hundred dollars last winter, and I have no doubt they will bring me as much this winter coming; and if you intend to be a farmer, and are wise, you will follow my example, and not be led into the wild goose chase of book farming.

Son—Well, father, I am not disposed to question your claim to the title of a good farmer; and I am proud of being descended from ancestors of that most ancient and most honorable calling; but should I arrive at the honor of pursuing it on my own account, I shall feel additional pride in meriting the appellation of a book farmer. If I can succeed in raising sixty bushels of corn from an acre with the same, or less labor than it cost you to raise thirty; and if I can obtain a breed of hogs which are not more than half legs, ears and snout; and which will not, like Pharoah's lean kine, cost more than their value, I shall not consider that I disgrace my worthy ancestors by so doing.

Father—Ah, John, when you are of age you will of course act for yourself and I hope, by that time, you will have more sense than to believe your sixty bushel stories, and hogs fatted upon moonshine. I have as good corn on the old family corn lot as any of my neighbors, and I think thirty bushels a pretty good crop. For my part, I dont think best to believe half the lies people tell.

Son—I have no wish, father, to believe lies; but I think I could give you most satisfactory proof that more than a hundred bushels of corn have been raised from an acre, in a great number of instances—

Father—Why, John—I would not believe so foolish a story, if I told it myself. But I see I have sent you to school to make a fool of you. I hope, however, you will out grow it when you get more discretion.

Son—I hope, Sir, I shall improve in discretion, but I am very sure discretion will never influence me against being a book farmer.

Father—A book farmer!—why, my son, I am tired of such folly—have not I always been considered a good, respectable farmer? Are not my crops always planted in season and tended and gathered in good order? What better can you do in farming, than to follow my example.

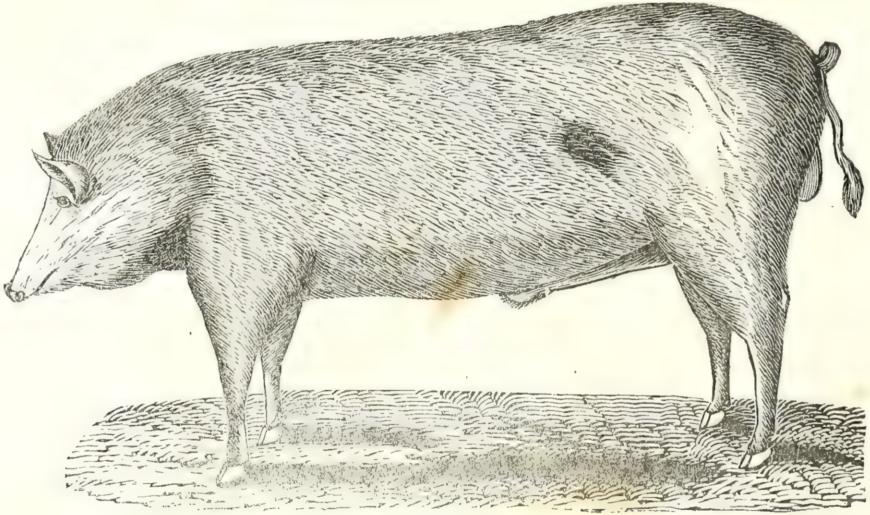
Son—Your example, father, as far as industry and attention to business go, are perfectly satisfactory, and I shall be proud to follow it. But you will excuse me when I tell you that book farming teaches me some improvements in the system of managing which I think are too important to be neglected. It teaches me that plants require food as well as animals; and that the ground which supplies that requires to be replenished from time to time with the means—it teaches me that if the manure which has been accumulating by the side of your barn ever since my remembrance, and is now rotting the covering, were spread upon your corn field, it would, at least, double your crop; that by changing crops the value of your land would be doubled. I have learned, by books, as well as by my own observation, that as great improvements may be made in the breeds of animals as in the choice and cultivation of vegetables, especially in the breed of hogs.

Father—Why, in the name of common sense, what improvement would you have in the breed of hogs? My hogs last fall weighed from three to four hundred—do you want any thing better than that?

Son—Why, sir, the corn which fatted each of your hogs, to that weight, would have been abundantly sufficient for three of the Berkshire breed, of the same weights, and that which feeds your store hogs, with bodies as lank as grey hounds, and looking as if you were breeding them for racing and leaping fences, would keep double the number of any of the improved breeds, with short legs and ears, so fat that their bellies would almost touch the ground.

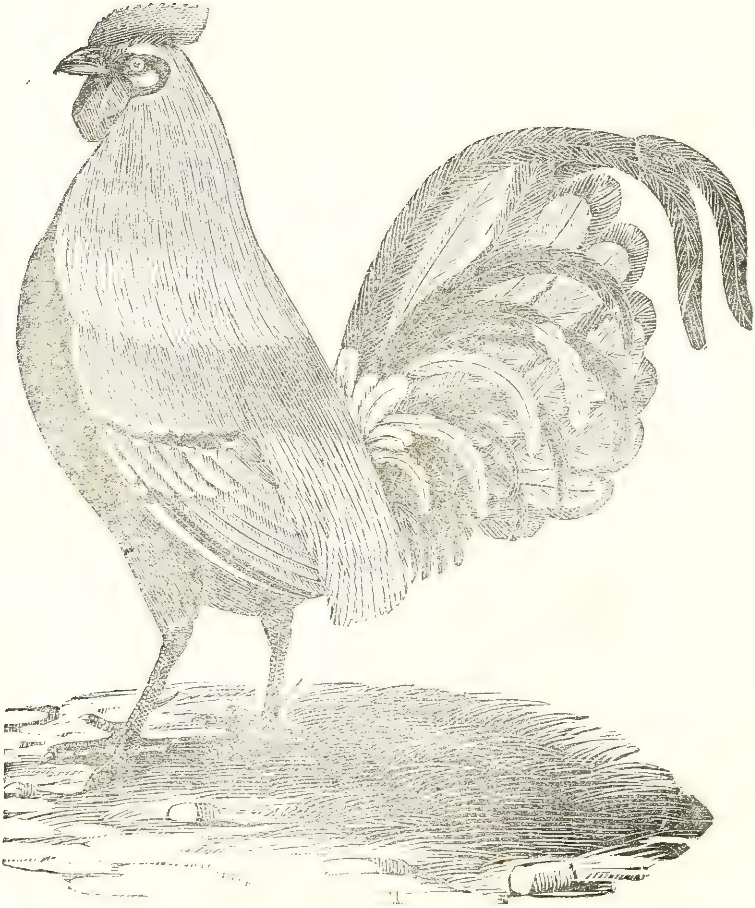
By the way, father, let me show you a sketch I made at Hoosic falls the other day—a fat hog, of the Berkshire breed, was turning to get at an ear of corn which lay between it and the fence, when a real racer, of your favorite breed, which was six or seven yards off, seeing the corn, and urged no doubt by his ever craving appetite, making what a Scotchman would call a *hop, step and leap*, jumped clean over him, and got the corn.

[*Albany Cultivator.*]



WOBURN BOAR.

POULTRY.



J.W. Orr Sc.
Crops D.

POLAND COCK AND HEN.

THE DOMESTIC FOWLS reared for food are divided into two divisions, viz: 1. *Gallinacea*, the cock kind, comprehending the common cock, the turkey, the Guinea-fowl, the peacock and the pigeon. 2. *Palmipedes*, the web-footed kinds, embracing the duck, the goose, and the swan.

The breeding and rearing of domestic poultry, as one of the branches of rural economy, includes two special, though different objects. The first is that of rearing poultry for amusement, and for the table of the owner; and the second is doing the same thing with a view to profit. In France, and other European countries, the raising of poultry is conducted on the large scale, in establishments erected for the purpose, and in the successful management of which no pains nor expense are spared.

The *Cock*, which may be regarded as a real blessing to humanity, is the first in importance of the gallinaceous kind: to what region he originally belonged is unknown to us, as the period of his servitude is hidden in the remotest ages of the world. He is found from the equator to the limits of the temperate regions; in some places very abundant, and sometimes of large size and great beauty. The male of the domestic species, says Professor Low, were we not daily familiarized with the sight of him, would appear to be a very graceful bird. His gait is erect, his eyes are sparkling; he is armed with spurs for his defence, and he is endowed with a courage which often causes him to die rather than yield to an enemy.

The female is remarkable beyond all other birds for her fecundity; she continues to lay eggs throughout a great part of the year; the period in which she ceases to do so, or does so very sparingly, is that of moulting, which generally lasts from one to three months. After having laid a certain number of eggs, the desire of incubation takes place. This is indicated by strong emotions, and a peculiar cry; and she will sit on any eggs that may be presented to her. Many expedients, some of them very cruel, are practised to check the instinctive passion so as to cause the animal to lay eggs rather than to hatch.

It is remarkable that while some of the females show this desire in the strongest manner, others scarcely manifest it, or, showing it, it quickly leaves them.—Hence, while some are engaged in producing eggs, others are ready to serve the office of mother, and on this account there is no kind of the domestic fowls that an be propagated so quickly, and in such numbers.

The period of hatching is 21 days. The female during this time manifests increasing watchfulness. She will scarcely be induced to forsake her charge, even by the most pressing claims for food, and hence food should be placed within her reach. The number of eggs which one mother is allowed to hatch, is generally from 10 to 15.

The young is gradually nourished within the shell. It lies without motion; its position is remarkable; its breast is towards one end of the egg, which is formed large for that purpose; its legs are bent forward to the breast; its head is couched beneath one of its wings; and its beak rises from between the wing and the back.

When the time of its maturity is at length arrived, the desire of life and motion awakens. The little creature employs its beak, thus singularly placed, for the purpose of breaking its covering. It is heard to tap the shell; the emotions of the mother increase as she listens to the attempt of the young to come forth. The beating of the beak is generally continued for 2 hours, sometimes for 6 hours, and sometimes for a longer time. At length the shell is broken, and the young is enabled to come forth from its marvellous mansion.

The anxious mother has no milk to give to her young when they come into day; but Nature has provided for all their wants. The mother teaches the young to find their food almost as soon as born, and their little bills are sufficiently hardened at their birth to pick it from the ground.

The change of nature in the parent is very remarkable. From the most timid of creatures, she now becomes fierce and courageous; she will attack the largest animal in defence of her young; she watches them with surprising solicitude; she shelters them under her wings, and leads them where food is to be found.—After a time her cares cease, she gradually recovers her natural timidity; she finally resumes all her habits, and leaves her long-cherished offspring as if never to know them more.

The varieties of the common fowl are very numerous, and distinguished from one another by their size, color, and fecundity. 1. The GAME-FOWL is a very singular creature on account of its habits. Size less than that of the common, fowl, symmetry of its limbs greater, and the beauty of its plumage remarkable when not mutilated for the barbarous sport for which it is destined. Its flesh is white, and esteemed beyond that of all the common kinds for its delicacy and flavor; but the singular pugnacity of disposition, which shows itself at the earliest period of life, deters all breeders rearing it except for the purpose of gaming. Whole broods, scarce feathered, become blind from continued fighting. They cannot be employed for crossing the common fowl. 2. The DORKING-FOWLS, so named from a town in Surrey, are the largest and finest of our domestic breed.—Their color is wholly white, their body is capacious, and they are prolific layers of eggs. They are distinguished by having five claws on each foot. 3. Equal to the Dorking in estimation, are the POLAND fowls. Their color is black, heads flat, and surmounted with a crown of feathers. They are a very useful variety, prolific of eggs, but less inclined to set, than those of any other breed. 4. The BANTAM is a little Indian breed, very delicate to eat, but, from the smallness of its size, not of any economical importance. 5. The CHITTAGONG or Malay fowl, is the largest variety of the species, but the flesh is regarded as inferior to those described.

When it is wished to form a *breed of fowls*, the breeding should be from a young stock. Hens are at their prime at three years old, and decline after the age of five. The best period to commence breeding is in the spring. The number of hens to one male from four to six, the latter being the extreme number—more are sometimes allowed, but it is a bad practice.

The methods of feeding fowls are various. The most common, where raised in ordinary numbers, is to suffer them to range about the homestead, in which case they are termed barn-door fowls.—Whether they are suffered to roam at large or are confined, there should be a poultry yard, where they may be regularly fed; and this should be properly laid out, on dry ground, well gravelled, and supplied with good water, and the whole well sheltered from the north and east. In this yard should be placed a quantity of dried sand, or effete lime—a mixture of both would be best, that the fowls may indulge the propensity so natural to them of rolling, basking, and dusting themselves.

A *poultry house* is indispensable to the profitable management of the business. In this the animals will roost, lay their eggs, and bring forth their young. Its situation should be dry, and its position such as to enjoy the sun's rays in winter as soon as he rises above the horizon. Cold not only benumbs fowls, but also retards and diminishes their laying—the want of pure water gives them the pip, costiveness, and other inflammatory diseases. Indeed, an infectious atmosphere causes them to droop, whence it naturally follows that their fecundity is less, that the flesh is not of so good a quality, and their rearing is attended with difficulty. Under these circumstances one may judge how important it is, for the improvement of poultry, that it should be wholesomely, comfortably and cleanly housed. To centre every advantage that can be wished for in a poultry house, it is essential that it be neither too cold in winter nor too warm in summer; the fowls must take a liking to it, and not be tempted to go to roost and lay any where else. Its size must be proportioned to the number of fowls, but sooner smaller than too large, for in winter they electrify, and impart their own warmth to each other.

Arthur Young was of opinion, that where a set of houses are intended, a situation should be selected near or close to the farm-yard, or to the east, rather near, but not too much so to the farmer's house, and with ample space around for the fowls to disperse over in the day time, and one or more ponds, if there are any of the aquatic sorts. All must have access to a gravelled yard and to grass for a range, with an abundance of clear pure water. Great attention should be paid to cleanliness and white-washing, not for appearance, but to destroy vermin. James Main, in his Treatise on Poultry says, of whatever size the building may be constructed, it should be raised a foot from the ground, walls thick, well plastered, white-washed inside and out, having neither chinks, crevices, or cavities, which leave room for martins, weazels, rats, and mice, and even insects to get in, and to remain there. The roof that covers it juts out very much, sheltering it from wet, the most dreadful scourge of fowls; the door is small, above which is an opening by which the fowls have ingress and egress by the aid of a ladder; they thus go easily to roost, as the roosts are fixed purposely on a level with this opening. There are two circular windows, the one to the east, the other to the west, furnished with a very close netted grating, and an outside shutter.—This description, it will be remembered, applies more particularly to a house of the following dimensions—twelve feet in length, ten in width, and the same in height.

Mr. Lawlence, who wrote a volume on the Treatment of Poultry, under the assumed name of *Mowbray*, makes the following observations on the construction of poultry-houses. A space thirty by fifty feet may be made choice of for the buildings and yards; the building may be ranged along the north side, and the three other sides enclosed with a trellis or slatted, or wire fence, from six to eight feet in height, and subdivided with similar fences, according to the number of apartments. The hen-house and turkey-house may have the roosts in part over the low houses for ducks and geese, and besides these there may be other apartments for hatching, or for newly hatched broods, for fattening, to serve as an hospital, or for retaining, boiling, and otherwise preparing food, killing poultry and other purposes. A flue may pass through the whole for moist or very severe weather; and the windows ought to have outward shutters, both for excluding excessive heat and excessive cold. In every apartment there ought to be a window opposite to the door, in order to create a thorough draft, when both are opened, and also a valve in the roof, to admit the escape of the hottest and lightest air. Every door ought to have a small opening at the bottom, for the admission of the fowls when the door is shut.—The elevation should be a simple style, and there may be a pigeonry over the centre building. The roost is sometimes a mere floor or loft, to which the birds fly up or ascend by a ladder; at other times it is nothing more than the coupling timbers of the roof, or a series of cross battens or rods, rising in gradation from the floor to the roof. The battens should be placed at such a distance horizontally as that the birds, when roosting, may not incommode each other by their droppings. For this purpose they should be a foot apart for hens, and eighteen inches apart for turkies. The slope of the roost may be about 45°, and the lower part should lift up by hinges in order to permit a person to remove the dung. No flying is requisite in case of such a roost, as the birds ascend and descend by steps, in which are spars for the poultry to sit on, ranges of boxes for nests, the roof, the door, which should be nearly as high as the ceiling, for ventilation, and should have a small opening with a shutter at bottom, to permit the poultry to go in and out at pleasure. The spars on which the clawed birds are to roost, should not be round and smooth, but roundish and roughish like the branch of a tree.

Feeding-house, in which are troughs with water and food placed all around, so that the fowls may feed constantly and without interruption, must be employed when fowls are reared in large numbers for sale. Poulterers know how to feed fowls with great expedition; and their method seems to be to give every kind of nourishing food. It is, indeed, under every circumstance, the rule of experienced feeders to give them a full allowance of food from their birth to their maturity.

Fowls are, of all birds, the most easy to feed, every alimentary substance agreeing with them; and they are seen the whole day long incessantly busied in scratching, searching, and picking up a living. No seed, however minute, can escape the piercing looks of a fowl.—The fly, most rapid in flight, cannot screen itself from the promptitude with which she darts her bill; while the worm which comes to breathe at the surface of the earth, has not time to shrink from her glance—it is immediately seized by the head and drawn up. Fowls that are thus feasted on seeds, worms, insects, and every thing else that may be found in a close and diligent search in the yard, barns, stables, and cow-houses, only require, in general, a supplementary feed, which is best distributed to them in the morning at sunrise, and before sunset in the afternoon. This meal is prepared in the following manner, according to Main.

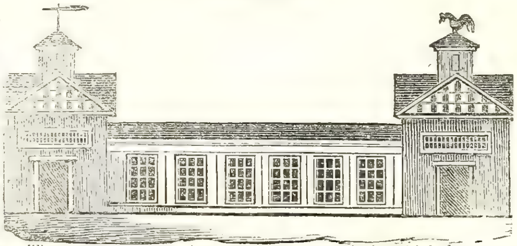
> On the day before, boil in the washing of dishes such pot herbs as the season affords; let them be mixed with bran, and then drained. On the following day this paste is warmed up and given to the fowls; after they have eaten of it, give them some of the siftings of wheat, rye, barley, buckwheat, or Indian corn bruised or cracked, and such crumbs and refuse matters as generally collect in the kitchen. The evening's meal should be similar to the morning's.

Indian corn, wheat, barley and oats are all employed in the feeding of poultry; but to fatten them on these articles, or even to keep them for the product in eggs, will prove an uphill business. It cannot be done to any extent with profit; and hence it is that so little attention is paid by our farmers to the raising of poultry. Poultry, all know, will feed on any kind of farinaceous substance, and the better the quality of the food, the more will they profit by it. It should be the object, therefore, of those who engage in the business of rearing poultry on a large scale, to study sound economy in feeding them, otherwise they will sustain loss. But there is no necessity for this great expense. Boiled potatoes, with the addition of a very small portion of Indian or barley meal, and with an occasional feed of cracked or boiled corn, will not only keep the flock in good condition, but will in a very short time produce a rapid degree of fatness. The knowing ones, as they are called among our farmers, who deal largely in poultry, fatten them altogether in this way. It is a saving of at least seven-tenths over the old method.

In fattening poultry, the quality of the food is a principal thing to be attended to; for if the ingredients on which they are fattened be otherwise than sweet, the flesh of the fowls will be deteriorated. Many persons suppose that it will answer to feed with any of the refuse of grain or any thing else they will eat. This may answer the purpose of the feeder for a time, but he will eventually lose his credit in the market.

Eggs are an extensive product of common poultry: they form an object of vast consumption, and are produced in numbers not to be computed. The eggs of the common hen are the only ones that may be said to be in daily use; not simply because they are the best and the most delicate, but also because they are, of all females in the poultry-yard, the most numerous, the most fruitful, and the most easy to rear. They are decidedly one of the best and most wholesome articles of food within the reach of man. They are also used for a great variety of other purposes than food.

We here introduce an extract from Mr. CALEB N. BEMENT's essay on Poultry, published in the Albany Cultivator:



POULTRY HOUSE.

THE annexed figure, showing the elevation of rather an extensive and costly establishment, would not only be very convenient but add very much to embellish the premises. The cupolas on the tops are for the purpose of ventilation as well as ornament. On the bottom of the cupola and inside of the building is a door hung on hinges, with a cord and pully attached, so that it may be closed or opened at pleasure. The gable ends may be turned to the south, in which dove-cots may be formed or they may be made in the roof as in the figure.

The buildings at the ends are intended for roosting apartments and laying and hatching. These buildings are to be thirteen feet square, and thirteen feet posts. I name this size as there would be no waste of timber, being just the length of the boards and joists. If not too near the dwelling-house, so that there could be no danger of fire from sparks, I would recommend to have the roof *thatched with straw*, as being much warmer in winter and cooler in the summer; and when well done it forms a tight and durable roof, and will last for twenty years. It should, however, be made much more sloping in order to carry off the water more readily.

A round hole one foot in diameter, with a sliding door, should be made in each apartment for the birds to pass in and out, and to confine them when necessary.

There should be no floor to prevent the fowls from coming to the earth, and the litter should be often removed, and the bottom sprinkled with lime at least once in each week.

Should be level & low,

The roosts should commence at the top and slope downwards, at an angle of forty-five degrees, like a ladder, to the ground. The cross pieces or spars should be of sassafras of two inches in diameter with the bark on, which is said to be a protection from vermin. No flying is necessary in this form of a roost, as the birds ascend and descend by steps. The spars should be placed one foot apart horizontally for hens and eighteen inches for turkies, so that they may not incommode each other by their droppings. Ranges of boxes may be hung around the sides for nests. To gratify the hen's organ of secretiveness the apartment must not be too light, and the access to the nests so contrived that she may steal quietly there unobserved. The boxes should have doors or covers to them so that the eggs can be removed without difficulty.

The long building with windows in front, connecting the two extreme ones, is intended for exercise in the winter, being made warm by filling in with brick, &c. and thatching with straw. The front to be ten feet high, roof sloping to the north. The windows are intended to admit light and heat from the sun; or the windows may be omitted, and the front finished in the form of a shed. This apartment is well calculated for feeding and watering, as well as for the gravel, sand, ashes and lime. Boxes may also be placed there for laying and hatching. By partitioning it off, two varieties of fowls may be kept separate; or one side may be appropriated for turkies and guinea hens, and the other to the gallinaceous tribe. These should open into a yard of considerable size, as room and space is necessary for their health, when they are not permitted the range of the barn-yard. The yard should be dry and have a southern exposure. Ventilation, cleanliness and pure water are essential to the health of poultry, as well as all domestic animals.

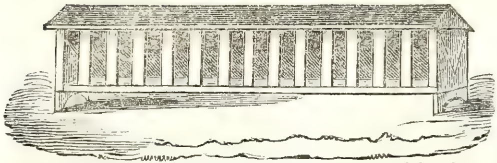
The yard should be enclosed by a fence at least seven feet high, with long sharp pickets, and the timber on which the pickets are nailed, unless some distance below the tops, should be on the outside to prevent the fowls from perching on them, as they seldom fly over a fence without alighting.

It appears to me from my experience to be the best method to feed fowls an abundance of nourishing food. Experience tells us also, it is better to give animals of all descriptions a full allowance of food from their birth to their maturity, and the same rule applies to fowls as to animals.

I have found all kinds of grain suitable for them; although some contend that buckwheat, some that oats, while others think there is nothing like corn to promote their laying; but it is my opinion that it matters but little what sort of grain is fed, only give them enough, and the better the quality of the food the more they will be benefitted by it. And not only will they feed on farinaceous food, but on animal substances, grease, suet and milk, sugar and molasses too are consumed by them. I have found wheat-screenings, which I procured at the flouring mills,
10 (a very good and cheap article for fowls. Corn, if fed alone, should always be cracked, as I)
have known some cases which proved fatal by swelling and distending the crop to bursting.

Feed should be scattered.

FEEDING HOPPER.

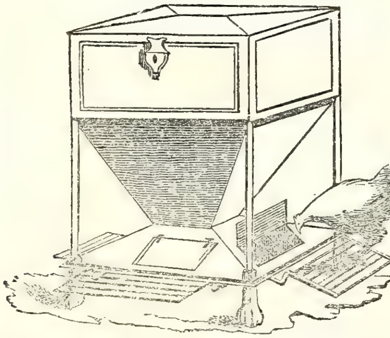


But to feed economically, feeding hoppers or boxes should be constructed for that purpose; and the one annexed I have found to answer a good purpose.

It is very simple and easily constructed, as you may readily suppose, when I inform you that I made it myself.—The dimensions are as follows: it is four and a half feet long, nine inches wide; end pieces fourteen inches high; the bottom four inches from the ground; a strip of board four inches wide is firmly nailed on the sides, raised two inches above the bottom, forming a manger or trough to prevent waste of food. Another strip three inches wide is nailed on the top in front to secure the ends. Narrow strips may be nailed to the top and bottom, leaving space enough for the fowls to enter their heads when eating. The hopper is formed by two pieces of boards nine inches wide set between the ends, as shown by the dotted lines like a V. They should extend to within half an inch of the bottom and from one to half an inch apart, according to the size of the grain. The top or roof may be the same width of the box, or it may extend over sufficient to protect the fowls from rain when eating. The length may be varied according to the number of fowls kept.

In the feeding of poultry I am convinced it is the best plan to keep feed constantly where they can help themselves whenever they desire it! and when it is kept constantly before them I think they will not consume as much as when fed at intervals from the hand. And for that purpose I would recommend the one described above, which I have had in use for some time.

IMPROVED FEEDING FOUNTAIN.



The annexed figure is an improved *poultry feeding fountain*, published a few years since in the "Transactions of the Highland Society," in Scotland, and figured and described in "Loudon's Encyclopædia of Agriculture."

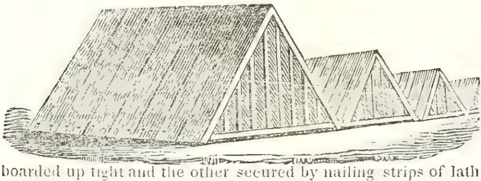
It may be made to contain any quantity of grain required, and none wasted. When once filled it requires no more trouble as the grain falls into the receiver below as the fowls pick it away; and the covers on that which are opened by the perches, (the principles of which I do not understand,) and the cover on the top protects the grain from the rain, so that the fowls always get it quite dry; and as nothing less than the weight of a hen on the perch can lift the cover on the lower receiver, rats and mice, (which are very troublesome where grain is fed in the ordinary way,) are excluded. It is astonishing, too, with what facility the fowls learn to leap upon the perch, and so open the cover of the receiver, which presents the grain to their view and within their reach. On their leaving the perch or platform, the door, either by a spring or a weight, closes at once.

WATER FOUNTAIN.

Fowls, like other bipeds of larger growth, prefer pure, clean water, and where a running stream cannot be had I would recommend a fountain like the figure annexed, which is nothing but a tight keg set on a three legged stool, with a small tube extending from the bottom to a shallow dish, basin or trough, which should be small, so that the fowls cannot get into it and soil the water. A demijon, carboy or jug may be used for the same purpose, and on some accounts the glass vessels may be preferred, as it can be easily perceived when empty.

And now, gentle readers, if your patience is not entirely exhausted with this, my dull and I fear tedious essay, I will describe my chicken-coop, and bid you "good bye" for the present, fearing you may never wish to hear from me again.

TENT COOP.



This is formed by nailing boards two feet in length, forming two parts of a triangle, like an inverted V, the ground forming the third, as I prefer having the fowls next the earth, so that we have only to remove the coop when necessary to cleanse it. It should be at least two feet long; one end may be boarded up tight and the other secured by nailing strips of lath, in the form of grates, leaving sufficient room between each for the free passage of the chicks without admitting the hen. There should be an earthen vessel or a wooden trough for water, and a shallow vessel or a board in front to feed them on.

Mr. Lawrence, in his work on Poultry, states that from five Poland hens he obtained in eleven months 503 eggs, weighing at the average of one ounce and five drams each—weighing 50½ pounds. From this will appear the great production of animal food from this source.

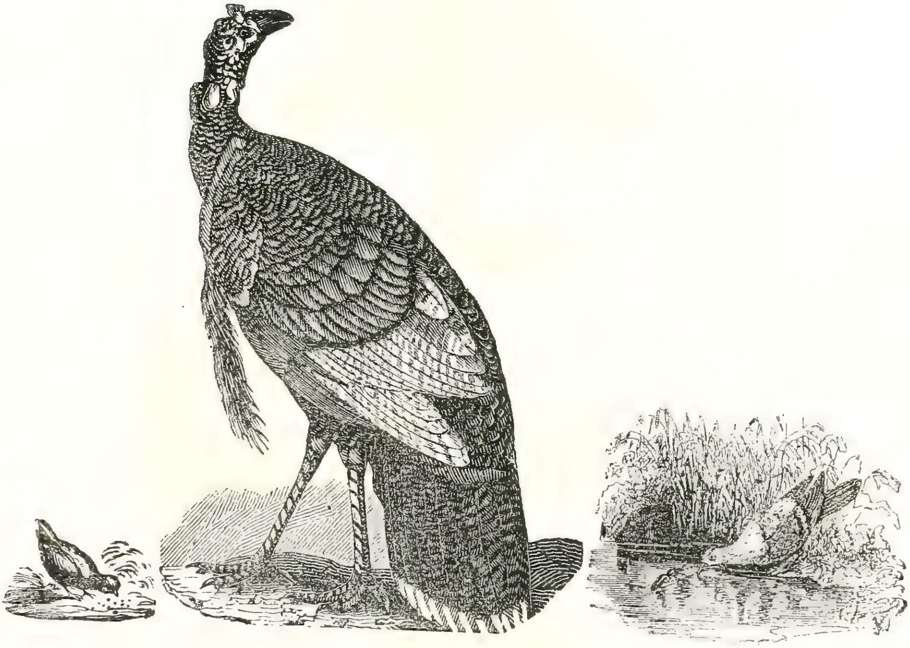
Last year, says Mr. Bement, my hens commenced laying on the 7th of February, and between that period and the 15th of August, we obtained 2,655 eggs from 60 hens; when the year previous, from 100 hens we did not get but a few over 1,000. This shows the importance of confining them so that the eggs can be readily obtained, and no time lost in "looking for hen's nests."

A friend of mine, who resides in a neighboring city, and keeps between thirty and forty hens, informed me, a few days since, that he had obtained eggs from his hens through the year; that is, there was not a single day in which he did not get some. This he accounted for as follows: he had one brood of very early chickens, and when the old ones ceased laying, for moulting, the pullets commenced; and in cold weather his yard is so completely protected by high buildings on the north and west, and receiving the full influence of the sun from the south.

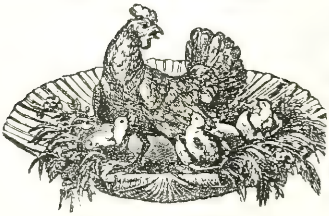
A neighbor who erected a poultry-house last summer, and took the precaution to have it filled in with brick, says his hens never ceased, but continued to lay during the fall and winter.

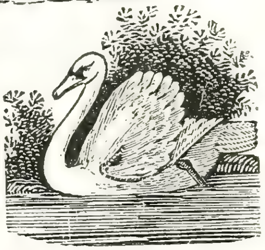
To preserve eggs, the pores of the shell should be rendered impervious to the air. Unctuous substances of different kinds are employed for this purpose, as suet, melted oil, and the like.

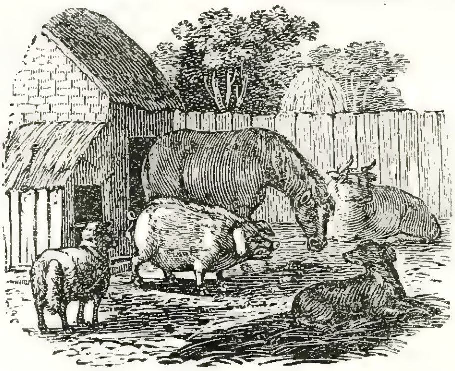
Turkeys.—Next to the common fowl, turkies form the most numerous tribe, and at the same time the most useful of the farm-yard. They are natives of North America. About the commencement of the sixteenth century (1525) they were introduced into England—first eaten in France at the marriage feast of Charles IX., in 1570, at which period they were already common in Spain; and so rapidly were they propagated in England, that we are informed that in the year 1585 they were not only scattered over the whole kingdom, but had become a common dish at country feasts. In those early days he was called the Indian Cock, and sometimes the Peacock of the Indies.



Gilbert







In his wild state, the color of the turkey is black, variegated with bronze and glossy green; and his quills towards the ends are tipped with white. By domestication he acquires that variety of colors which we see him to possess. In his native woods, the turkey is found in large flocks; he roosts upon the highest trees and becomes an easy prey to the hunter; he retires before the progress of the settler, taking refuge in the boundless forests of the interior.

The turkey is an important addition to the domestic fowls. There is but one species of the domesticated turkey, but great varieties, distinguished chiefly by their size and color. The turkey is more tender, and difficult to rear, than the common domestic fowls. The hen lays a considerable number of eggs in spring; the period of her incubation is 30 days; and from 10 to 15 eggs are usually assigned to one female. She will sit upon her eggs frequently without the desire to leave them, and hence the propriety of supplying her with water and food while sitting. Her cry at the period of maternal solicitude is plaintive and expressive, but she treats her young with less seeming care than might have been looked for. She travels with them very fast to great distances, and often leaves them straggling behind her; hence it is usual to confine her to a coop till the young have acquired strength to follow her. And frequently even, on account of her wandering habits, her eggs are given to be hatched by a common hen. She is wonderfully vigilant when birds of prey appear; and by a peculiar cry, gives the alarm to her brood, which instantly seek for shelter, or couch themselves upon the ground.

As soon as the young are hatched, they must be withdrawn from the nest, and kept warm. The hen and brood must then be housed for some time, after which she must be cooped during the day in the open air, till the young acquire strength to follow her. During this period the young are fed on farinaceous food, kneaded with water, and mixed with cresses, nettles, or other green herbs, cut small.—Though they are tender at first, yet when half-grown, and well feathered, they become hardy, and will range abroad, providing themselves with insects and other food; but care must be taken that they be well fed when let out in the morning, and when they return in the evening. It is to be observed, that if a large wood be near, the creatures, with the instinct of their race, will stray towards it, without any seeming wish to return.

When they are put up for final feeding, sodden barley, or the meal of oats, barley and wheat, are their appropriate food. A common practice is, after they have been allowed to glean in the stubble-fields in autumn, to put them up for fattening. A good weight for a turkey is 15 lbs.; but they are sometimes fed to 20 and even 30 lbs. The abominable process of cramming is sometimes also adopted with the turkey, and thus it is compelled to become fat in the shortest time. The eggs of the turkey are regarded as delicate by those who are used to them, but they are not much an article of consumption.

These birds are exceedingly voracious, and if grain merely were given them, greedy as they are, they would merit the appellation of wheat-coffers. But there are other modes of feeding them, better and infinitely cheaper. Neither are they as much trouble or impose as much care on the breeder as some imagine. They are these:—In the first days of the life of the turkey, to secure it from the alternations of heat and cold, of dry and wet, to give it proper economical food, and not to lose sight of it till the red shoots.

Turkeys should be allowed to enjoy themselves freely in the open air; as soon as the red begins to shoot, the young turkey manifests a desire to perch in the open air. Open sheds, when they can be made secure against intrusion of enemies, are best suited to them. By placing the bars on which they roost several feet above the surface of the ground, the air that surrounds them is constantly renewed.—They require roomy habitations, in order to preserve them from the effects of their own infection. The place in which they are kept should not only be well ventilated, but occasionally fumigated. They cannot endure confinement even for a night in a filthy hen-house.

The scorching sun and rain are, above all, hurtful to young turkeys, and it must be an indispensable care to shelter them from the one and the other, at least during the first six weeks or two months, which is about the time the weak stage lasts.

Fattening turkeys is an easy process; at the commencement of cold weather, when they are generally about six months old, they are to receive better and more plentiful food, in order to increase their size and plumpness expeditiously. For this purpose their appetite must be well supplied, and the common diet will answer; but if they have not one sufficiently keen, they should be confined to the farm-yard. The following preparation may be given to them every morning for a month or six weeks. Boiled potatoes, mashed, and mixed with corn, buckwheat or barley meal, according to local resources, made into a paste or mush, and of which they may eat as much as they can. Every evening the remains of the paste must be carefully removed, and the vessel in which it had been put in the morning, thoroughly cleansed. The food of this bird must be kept clean, and the utmost care taken *not* to give them on the morrow the remains of the paste of the preceding day.

The turkey is not a hardy animal, and is subject to diseases which may be avoided by proper treatment. Sometimes the plumage bristles up all over the body, and they have a languishing aspect; on examining the feathers of the rump attentively, two or three will be found whose quill part is filled with blood; remove these and the poor turkey is soon restored to health and strength.

The Pintado or Guinea-fowl, *Numida Meleagris,* is a native of Africa, where it is found in vast flocks; but it is now diffused over every part of Europe, the West-India Islands, and a great part of America. The pintado is a restless, noisy bird; the female lays numerous eggs, which are smaller than those of the common hen, but esteemed much more delicate; like other gallinaceous birds, she is apt to secrete her eggs until she has produced her brood.

The pintado is an agreeable variety in the poultry-yards, liked by some for its flesh, and by all for the delicacy of its eggs; but it is of little economical importance. The chicks are very tender, and should not be produced too early in spring. They are generally hatched by the common hen, who either covers a large number of them, or is found to be a more careful nurse than the pintado herself. The method of rearing and feeding is similar to that of the common or domestic fowl.

The PEACOCK, *Pavo cristatus*, need scarcely be mentioned as a bird of economical use. Pea-hens and pea-chicks, indeed, are occasionally used for food, but this splendid creature is, and ought to be, regarded solely as an object of beauty. It is a native of India. The advantages to be derived from rearing it for food are not to be thought of.*

The COMMON PIGEON, *Columbia livia,* is a race of birds multiplied throughout the warmer and temperate regions; but it is in the warmer regions that they attain to their greatest size and beauty of plumage. They have been in all ages the favorites of mankind, to which their innocence and beauty seem to give them a peculiar claim. But if it be as farmers that we are to regard the pigeon, the beautiful favorite, unfortunately, cannot attract much of our regard. Nothing beyond the gratification of luxury can be derived from the cultivation of the domestic pigeon for food. In vain has it been asserted that pigeons do not feed upon green grain, cannot dig into the earth with their bills, do little harm to the cultivated crops, and consume only the seeds of injurious plants. The experience of farmers shows that the damage done by these creatures to our various crops of wheat, peas, and beans, is very great; and certainly the waste is in no degree compensated for by the quantity which the animals afford of human food.

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* The large tail feathers answer for making the most beautiful and excellent "fly brushes" for driving flies from the dining table—and it might be an object to raise the Peacock for this purpose.

Yet, as pigeons are in demand as objects of consumption, and as they afford a luxury and convenience to those who live in the country, the subject of their management is, like every branch of husbandry, deserving of attention. If pigeon-houses are to exist at all, those who possess them should know how they are to be best managed, so that the largest return may be derived from them.—Though there is scarce any branch of the management of the domestic fowl more misunderstood, yet the essential rule of management is simple. Its principle consists in regular feeding, in giving sufficient space to the birds, and in paying a strict attention to cleanliness.

The next in order of the domestic fowls are the Web-footed. These birds, when domesticated, become enlarged in their form, and wholly the creatures of their new condition, though they still remain partial to an aquatic situation, swimming with facility, and feeding on fish, insects and the leaves and grains of aquatic plants. They are hardy, easily propagated and fed, and afford a rich and savoury food.

1. The Wild Duck or Mallard, *Anas bŏschas*, is the original of the common domestic species. It is widely diffused over the world, inhabiting America, Europe, and Asia. These birds live in the marshes, lakes and rivers of the North in incredible numbers. In autumn, they migrate southwards in numerous bodies, the greater part returning in spring to their former haunts, though large flocks and scattered pairs remain and breed in the morasses and rivers of lower latitudes.

The wild duck in its natural state is a wonderfully shy and cautious creature. It breeds once in the year, the pairing time commencing about the end of February, and each couple living apart amongst the reeds of lakes, rivers, and marshes, where they breed. Nothing can be more tender than the care of their offspring by these birds. The nest is formed on the ground, generally in a tuft of reeds or rushes, bent into form, and lined with the down of the parents. The incubation lasts 30 days; when the female quits her charge for food, she covers up the eggs, the male in the mean time keeping watch near the nest; and when she returns, she approaches cautiously, winding that she may avoid discovery. The young burst their shells nearly at one time, and in a few hours the parents conduct them to the stream, where they at once begin to swim, and feed on herbs and insects; and at night they are gathered together under the wings of the dam. In three months they can fly; and in three months more their growth and plumage are complete.

The domestic duck adapts his habits to his new condition. He no longer retires with one female to pair, and tends his brood, but becomes polygamous; and he loses the caution and sense of danger which distinguished him in his wild state. Still, as in the wild state, by means of his nicely-formed bill, he finds in marshes and elsewhere the food that is suited to him. He feeds alike upon animal and vegetable substances; on the spawn of fish, and the larvæ of insects; upon grass, the seeds of aquatic plants, and even sea-weeds. These birds may be said to be omnivorous, and this it is which, with their hardy qualities, renders them so easy of culture.

The duck begins to lay her eggs in February, and, obeying her natural instinct, she will, unless confined, lay them abroad, and conceal them. During the period of hatching, she requires no other care but to be kept undisturbed. When she wants food, she will go in search of it, covering up her eggs as in the wild state. When the young are hatched, they should be allowed to remain in the nest so long as the dam chooses; after which she may be put into a coop in the open air during the day for a short time. She should then have a full allowance of good food and water, while the young should likewise have a flat dish put down to them with water frequently renewed, with a proper supply of meal or other farinaceous food, such as boiled potatoes.

A common hen is frequently substituted for the natural parent to hatch the eggs of the duck. But wherever there are any pools of water, the proper nurse is the duck herself; she conducts her young to their natural element, and brings them from it when it is time, while, when a hen is the nurse, they disregard her signals on the bank, and do not themselves know when to return.

The feeding of these fowls is easy. In certain situations, they are allowed access to their natural haunts, the marshes and the bogs, where they feed; and when they are to be ultimately fattened, they are fed for a short time on farinaceous food. As in the case of other fowls, there are also breeds of the common duck more or less valued; and there are some singular varieties, as the hook-billed duck, reared in aviaries and poultry-yards.

The Mallard is the original of the ducks usually reared for economical purposes. Other species, too, are sometimes domesticated. One of these is the Chinese duck, *Anas galericulata.* A large species is the Muscovy duck, or, as he ought rather to be called, the Musk duck, *Anas moschata*, a native of Paraguay, and the neighboring provinces. He there perches on trees by the sides of rivers and marshes, and breeds several times in the year; he is very shy in his wild state, but readily submits to domestication; he is larger than the common species, very prolific, and easily fattened.

2. The Wild Goose *Anas anser*, a native of America, is another of this valuable family, widely extended over the world, and susceptible of entire subjection to the will of man.

Like the wild duck, this fine animal quits the swamps of the vast wilderness of the North on the approach of winter, and migrates far to the South. From 50 to 100 individuals are often in flight together, at a vast height, sometimes beyond the reach of vision, and only recognised by their shrill voices. All have witnessed the surprising regularity of their flight; the leaders forming the apex of an angle, and cleaving the air, as it were, for those that follow. They pursue their lofty flights from vast distances, and when they alight for food or rest, they station sentinels, to guard them from surprise.

Part of them remain to breed in the lakes, rivers, and fens of lower latitudes, but the greater number of them return to the boundles regions of marsh and forest whence they had taken their flight, and where they can rear their young in security.

The domestic race of this species generally loses the desire of escaping, although a few instances occur of the tame joining the wild race. The tame variety is reared in every civilized country. Its habits render it an easily cultivated animal, and it is an object of great economical importance in the districts of fens and marshes, which are the most suited to the rearing of it.

The period of incubation is from 27 to 30 days, and the female covers conveniently from 11 to 15 eggs. She manifests the period by carrying straw in her mouth, and then a nest should be prepared for her in a secure situation. During the time of hatching, the male stands a watchful sentinel, and will fiercely attack the largest animals that approach the nest.

After the young are brought from the nest, the dam may be penned with them on a spot of dry grass, while farinaceous food, water, and any wholesome green herbs, must be supplied. After a short time, the dam and her brood should be allowed to forage for themselves in the fields and marshes. They are perfectly herbivorous, and will graze like sheep. Those who are favorably situated with respect to the means of rearing these fowls, seldom give them any more attention, than to drive the broods, with the dams, to the contiguous fens or marshes where they feed.

In situations less favorable, more attention must be paid to the feeding of them. They must be well supplied with food like other fowls, but it constitutes the particular facility of rearing these animals, that not only farinaceous substances, but every kind of edible herbs, as turnips, potatoes, the refuse of the garden, and the like, may be given to them. They may be soiled, too, on clover and tares; and when being fattened, steamed potatoes, meal mixed with milk, and the like, may be given to them.

The young are either disposed of at a month or 6 weeks old, when they are termed green-geese, or they are retained till after harvest, and fed upon the stubbles, when they are termed stubble-geese. If they shall not be sufficiently fattened on the stubbles, they must be put up to feed, all that is necessary in this case being, to give them plenty of water and constant food, and to litter them carefully with straw.

Besides the produce in flesh, there are derived from this animal down and feathers, both those of the wings, which are made into writing-quills, and those of the body, which are applied to different uses. This has given rise to the dreadful barbarity of plucking the animals, which is sometimes done five times in the year.

3. The Domestic Swan, *Anas olor*, has in this country ceased to be regarded as food, and is now preserved solely for the beauty and majesty of his form, with respect to which he is the noblest of all the water-fowls. He feeds like the goose, but is more aquatic in his habits. He is gentle and familiar to his keepers, eating his food from the hand; but while engaged in the rearing of his brood, he is fierce and dangerous to be approached. He is a bird of great courage, but is never the assailant of others.

It is stated on the authority of the Maine Farmer, that geese may be fattened on turnips with very little trouble or expense. The turnips are cut in small pieces resembling dice, but smaller, and placed in a trough of water. An experiment was made, and it was found that with this food alone, six geese, each of which when lean weighing nine pounds, actually gained twenty pounds each in three weeks fattening. Malt is an excellent food for geese.

STATISTICS.

The annual consumption of poultry and small game in the city of Paris usually amounts to 22,000,000 lbs.

"The quantity of eggs used annually in France exceeds," says one of the late journals, "7,250,000,000, of which enormous number Paris uses about 120,000,000."

"The importation of eggs from Ireland in 1837 to Liverpool and Bristol alone, amounted in value to £250,000. The importation from France the same year was probably greater."

"It appears, from the custom house returns of the year 1838, that eggs were imported into England (although loaded with heavy duties,) from the continent to the value of more than a million of dollars."

"It appears," says M'Culloh, "from official statements that the eggs imported from France (into England) amount to about 60,000,000 a year; and supposing them to cost, on an average, 4*d*. per dozen, it follows that the people of the metropolis of Brighton (for it is to that place they are most all imported,) pay 23,000*l*. a year for eggs; and suppose the freight, importer's and retailer's profit, duty, &c., raise their price to the consumer to 10*d*. per dozen, their total cost would be 213,000*l*."

The number of eggs imported into England from various parts of the continent, in 1839, was 83,745,723, and the gross amount of duty received for the same was 29,111*l*.

It has been ascertained that half a million of eggs are consumed every month in the city of New York. One woman in Fulton market sold 175,000 eggs in ten weeks, supplying the Astor House each day with 1000 for five days of a week, and on Saturday, 2,500.

"When we look," says McQueen, "at the immense number of eggs brought from Ireland (50 tons of eggs, and 10 tons of live and dead poultry, having been shipped from Dublin alone in one day,) and 66,000,000 of eggs imported from France to London alone; and this immense number, a trifle certainly to what are produced in this country (England,) we shall cease to wonder at the large capital (8,000,000*l*.) invested in poultry of all kinds. The quantity of eggs imported into Liverpool from Ireland, in 1832, was 4097 crates, value 81,940*l*. sterling; which, at 6*d*. per dozen, gives 3,297,600 dozens of eggs, and the number 39,331,200. In 1833, the import had increased to 7,851 crates, or upwards of 70,000,000. The number imported into Glasgow from Ireland in 1835, by the custom house entries, was 19,321 crates, which, at nine eggs to the pound, gives the number 17,459,568."

It is stated in a Providence paper, that one sloop has regularly, for twenty-three years, made twenty-five trips a year from Westport, Mass., to that port, during which period she has carried to that market, on an average, four hundred dozen of eggs each trip, making altogether a total of 3,450,000, averaging twelve and a half cents per dozen, amounting to $35,500. Large quantities of eggs have found their way from Ohio to our cities, by means of the canals and railroads. In May, 1842, seventy barrels, containing 70 dozen each, amounting in number to 58,800, were sent to Boston per railroad.

In December, 1793, the number of turkeys sent to London, by the stage coaches from Norwich alone, amounted to upwards of 2,500, weighing nearly 14 tons.

The week preceding Michaelmas day, 1830, forty tons of poultry were sent from Bury St. Edmund's, Suffolk, to London, 30 of which were geese; and 16 tons of the latter were the property of Messrs. Flatt & Walton, poulterers of Yostock and Repworth. Mr. Clarke, of Boston, transmitted to London in December 1833, the following quantity of poultry:—2400 geese and 800 turkeys; Mr. Harris, poultry-man of Spalding, also killed and forwarded to Leadenhall market, 1150 geese, 500 turkeys, 200 ducks, and 30 dozen of fowls.—*Mowbray.*

The production and consumption of poultry and game in Europe, may be judged of by the consumption of Paris, in 1832, which comprised the following articles and animals, according to Count Chalsol:—931,000 pigeons, 1,289,000 chickens, 549,000 turkeys, 238,000 geese, 131,000 partridges, 177,000 rabbits, and 174,000 ducks.

The editor of the Farmer's Cabinet, published at Philadelphia, says, "A farmer, who regularly attends market, sold during one year poultry and eggs to the amount of about $150, and the expense incurred in their production was so small as scarcely to be appreciable."

By referring to the agricultural statistics of the United States, as furnished by the last census, taken in 1839, and published in 1840, it would appear the value of poultry in the State of New York amounted to $2,373,029, and that of the various States and Territories of the Union amounted to the sum of $12,176,170.

More attention has been directed to poultry in the vicinity of Philadelphia, than any other part of our country. The Bucks county poultry, like the Dorking of Surrey, in England, have acquired a greater degree of celebrity even in the New York market, where they are sometimes found in abundance.

The foregoing is proof of the magnitude of an interest, which is deemed by most farmers of too trifling consideration to be worth making any calculation about. It is, without doubt, a proportionately great interest in this country; yet, who in this respect deems it worth attending to?

In England there are exhibitions and prizes awarded for the best poultry. At their exhibitions noblemen of the highest rank become competitors. Earl Spencer, in 1837, carried the highest prize for a turkey, which weighed 20¼ lbs. One capon was exhibited which weighed 7 lbs. 14 oz.; one pullet 6 lbs. 3 oz.; one goose 18 lbs. 2 oz.; one pair of ducks, 10 lbs. 10 oz.

Here in America, without the aid and stimulus of exhibitions and prizes, turkeys have been known to weigh over 30 lbs. In a Philadelphia paper it is stated that, "On Thursday, December 29th, 1842, a farmer from New Jersey obtained $10½ for a turkey curiously. The farmer boasted that his turkey weighed 30 lbs., and asked a price for it proportioned to its dimensions. A customer, doubting this, said he would give him five dollars for the turkey if it weighed 25 lbs., and one dollar for every pound over that weight. The defunct turkey was put in the scales and weighed 30½ lbs. The gentleman kept his word, paid $10½, and took his fowl home for his New Year's dinner."

A pair of chickens were exhibited at one of the hotels in Philadelphia, in April, that weighed 19¼ lbs. after being dressed. These fowls were bred and fattened by the Messrs. Woods of Haddonfield, N. J.

In December, 1822, two turkeys were bred and fed, and sent to Cork, one weighing 33, the other 34 lbs.

In the 7th edition of Mowbray on Poultry, it is asserted that "three turkeys were sold at Leadenhall market, December 25th, 1833, which weighed together 91 lbs. and brought three guineas each. One, eighteen months old, weighing 34 pounds, was sold at the same price."

THE HONEY BEE.

We should like very much, if the limits of our work would permit, to devote a more considerable section to the rearing and management of this remarkable and interesting item in the great family of animated nature than it is our purpose to do. The bee is an object of attention, more or less, in every civilized country, and is deserving the care of every farmer who would add to the charms of his home and at the same time secure a source of luxury if not of profit. There are countries much more congenial to the bee than ours.—In the Island of Cuba, for instance, they are kept with great success.—They are not enervated by the warmth and perennial fruitfulness of the climate, but work on, accumulating stores, though there is to be no winter in which they will be wanted. Many of the Cubans have hundreds of swarms. All the owners do is to furnish hives, which only requires them to cut a large hollow tree into pieces three feet long and laying them under sheds, to fasten a stick through the centre, upon which the bees begin to build. The hives swarm frequently, and being trained to thorough industry, they are abundantly successful among the fragrant flowers. When a hive is full of honey, the bees seal it up at both ends, and go to another, so that the planter has only to take away the rich stores from the deserted dwellings—for, as there is no winter, the bees are always laying up and never consuming.

The case, however, is very different in our own more rugged climate, where long and severe winters have to be encountered, and where even the summers vary so much that the success of one season affords no sure guaranty of similar results the next.—But still, we hold that bees will pay for the trouble bestowed upon them, if in suitable locations, and they are managed with the necessary skill and perseverance. We know that the prosperity of bees is greatly affected by the character of the season.—Three years ago, the season was highly favorable in a section of country which we particularly noticed—the next season was a bad one, owing, as was supposed, to the excessive rains, which kept the flowers too long wet to be in a favorable condition for the bees to obtain their peculiar delicacy.—The honey was greatly deficient in quantity, and of a *watery*, unpleasant taste. The season just passed was also unfavorable, owing to a directly opposite cause—the *drought*, which so generally prevailed. It is remarked that the bees swarmed less than usual, *robbed* more, and, of course, failed to afford satisfactory remuneration to their owners. But still these facts do not shake our confidence in the policy of keeping bees in situations combining the essentials of success.—These essentials consist of convenience to water and *pasturage*, or those numerous flowers and trees from the blossoms, &c. of which honey is most readily and abundantly obtained. We therefore proceed to extract from Mr. Bevan's essay some details on this point.

It is of the first importance to the success of an apiary, that it should be in a neighborhood where the bees can be supplied with an abundance of good pasturage, as upon that will depend the fecundity of the queen and the harvest of wax and honey. If *Dutch clover* be neither grown abundantly by the neighboring farmers, nor the spontaneous growth of the surrounding country, the apiarian should if possible, crop some ground with it himself, as it is one of the grand sources from which bees collect their honey in the spring, and indeed during a considerable portion of the principal gathering season. From its value in this respect, one species of it has acquired the name of Honey-suckle clover. *Yellow trefoil* also, though not so great a favorite with the bees as Dutch clover, is nevertheless a valuable pasturage for them, in consequence of its blossoming earlier than the clover.

Though I have made Dutch clover take precedence of every other bee pasturage,—a precedence to which, at least in this country, (England) it is fairly entitled,—yet it is by no means the first in the order of the seasons.

"First the gray willow's glossy pearls they steal,
Or rob the hazel of its golden meal,
While the gay crocus and the violet blue
Yield to the flexile trunk ambrosial dew."

The earliest resources of the bee are *the willow*,* *the osier*, *the poplar*, *the sycamore*, and *the plane*, all of which are very important adjuncts to the neighborhood of an apiary. The catkins of several of them afford an abundant supply of farina, and attract the bees very strongly in early spring when the weather is fine. Mr. Kirby, in his *Monographia Apum Angliæ*, considers the *female* catkins of the different species of Salix as affording honey, the male one, pollen. To these may be added *the snowdrop*, *the crocus*, *white alyssum*, *laurustinus*, &c. *Orange* and *lemon trees* also, and other *greenhouse plants*, afford excellent honey, and might be advantageously presented to the bees at this season. *Gooseberry*, *currant* and *raspberry trees*, with *sweet marjoram*, *winter savory* and *peppermint*, should not be far off them. From the early blossoming of the two first, and from their yielding an extraordinary quantity of honey, they form some of the first sources of spring food for bees, and in all probability furnish them with the pale green pellets then seen upon their thighs. *The peach, nectarine*, &c. are also valuable, on account of their blossoming very early. *Apple* and *pear trees*, may be said to constitute a second course for the bees, after their earlier spring feast on the willows and on the bloom of the currants, gooseberries, and all the varieties of wall fruit. *Alder buds* and *flowers* are particularly grateful to bees; the former are said to afford honey for six months together. The *maple* and the *lime* afford it for a considerable time. The blossoms of *turnips, mustard*, and all *the cabbage tribe* are also important auxiliaries; their culture is strongly recommended by Wildman, as affording spring food to the bees. In the autumn a field of *buckwheat* becomes a very valuable resource for them, from its prolonged succession of bloom. Huber has given his testimony in favor of this black grain, and Worlidge says that he has known the bees of a very large apiary fill the combs with honey in a fortnight in consequence of being placed near a large field of buckwheat.[*] Bees indeed like to have everything upon a large scale; whole fields of clover, beans, the brassica tribe, and buckwheat attracting them much more strongly than scattered plants, though affording finer honey, such as creeping lemon thyme, mignonette, &c.

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* The *willow* accommodates the bees in a kind of threefold succession; from the flowers they obtain both honey and farina;—from the bark propolis; and the leaves frequently afford them honey-dew at a time when other resources are beginning to fail.

Some flowers they pass by, though yielding a considerable quantity of honey: those of the honeysuckle for instance, though much frequented by the humblebee, are never visited by the hive bee, the superior length of the proboscis of the former enabling it to collect what is quite out of the reach of the latter.

"Your bees will rejoice," says Mr. Isaac, "when they see the neighborhood variegated by the blossoms of *sunflowers, hollyhocks*, and *Spanish broom*, and even the *dandelion*, which embellishes the garden of the sluggard." Dr. Evans observed that bees not only collect farina from the numerous assemblages of anthers in the flower of the hollyhock, but a balsamic varnish also, (most likely propolis,) from the young blossom buds, and says he has seen a bee rest upon the same bud for ten minutes at least, moulding the balsam with its fore feet and transferring it to the hinder legs. *The holly, the privet, phillyrea*, and *common bramble*, together with *sweet fennel, nasturtiums* and *asparagus*, are also much frequented by the bees. They are likewise very partial to the yellow flowers of *the crowfoot*, as well as the flowers of *dead nettle*, especially the white. The blossoms of *the cucumber, gourd*, and *vegetable marrow* also, yield a considerable quantity both of honey and farina, as do likewise those of the *white lilly*. Dr. Evans speaks of the *Cacalia* or *Alphine coltsfoot* as affording a great quantity of honey, the scent of which is often diffused to a considerable distance; and Dr. Darwin, in a note to his "Botanic Garden," mentions having counted on one of these plants, besides bees of various kinds, upwards of two hundred painted butterflies, which gave the appearance of being loaded with additional flowers. "What is it," says the anonymous writer, "that brings the bees buzzing round us so busily? See, it is this tuft of coltsfoot, which they approach with a harmonious chorus, and after partaking silently of the luxurious banquet, again set up their tuneful Pæans."

Ornamental flowers, such as roses, ranunculuses, anemones, pinks, the carnations, afford little or no pabulum for bees, and tulips are probably pernicious to them, dead bees being frequently found in their flowers.

It would be a great acquisition to the bees to have near them a large plantation of *borage*, which affords peculiarly delicate honey, as does also *viper's bugloss*. The former continues blooming for many months, and, bearing a pendent flower, "hanging the pensive head," it is not liable to be washed by rain; *mignonette* too if sown abundantly is a plant of considerable importance to the apiary, and for a somewhat similar reason, its continuing in bloom till the autumnal frosts set in, and yielding honey of peculiar whiteness and delicacy. Instances are recorded of an abundant crop of these two flowers affording a large supply of honey to the apiary near which they were sown, when, at the same time, there was a general failure of all the neighboring stocks.

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[*] We do not know whether the experiment has ever been made, but to us it appears to be a reasonable opinion that the owner of a somewhat extensive apiary would find it a good practice to sow patches of half an acre or more with Buckwheat, beginning as soon as safe from frost in the spring, and continuing such a succession of sowings as would always have a portion of the ground allotted to the purpose *in bloom for the bees*. If seed should mature, harvest it—if not, turn down the straw with the plough or take it to the barn for litter and manure. Properly cured, cut and mixed with meal, we doubt not but it would be acceptable to the cattle.

Lemon thyme should be planted in every bee-garden, wherever room can be afforded: it blossoms late, the beginning of August, and yields very fine-flavored honey. It might be advantageously used as an edging for garden walks and flower beds, instead of box, thrift, or daisies. Box has the character of giving honey a bitter flavor. The *common teasel* not only supplies honey from its rich purple heads, but yields a seasonable supply of water in the cups formed by their leaves at every joint of the stem, which contain a spoonful or more of water. This, as well as *the great hairy willow herb*, a very ornamental, though a very common plant, growing by the sides of rivulets, is therefore a desirable adjunct to every apiary. So likewise are *furze*, *broom*, *heath* and *saintfoin*. The blossoms of furze so abound with honey as to be pervaded strongly by the scent of it, and the broom has been extolled ever since the days of PLINY. Mr. BRADLEY speaks in the highest terms of its blossoms, as affording a great quantity of honey; but he greatly prefers the *Spanish broom* and says that an acre of it would maintain ten stocks. The culture of saintfoin as a bee-pasture is also well worthy of the apiarian's attention in some situations; for though it flourishes best in a calcareous soil, it will thrive in soils which are too poor either for grass or tillage. Furze and broom are particularly serviceable on account of their blossoming early and long, and abounding in farina.

On the other hand, the lateness of its bloom makes *ivy* a very valuable resource for the bees. Mr. HUNTER recommends St. John's wort, which also comes in late, as a favorite plant for collecting pollen, for winter's store.

Commons surrounded by woods are well known to make an apiary productive, the commons abounding with wild thyme and various other flowers, which the scythe never touches; and the trees, in addition to their farina, affording in some seasons a profusion of honey-dew. The forwardness and activity of hives thus situated, may, in part, be attributed to the sheltering protection of the woods.

HONEY-DEW.—The term *honey-dew* is applied to those sweet clammy drops that glitter on the foliage of many trees in hot weather. The name of this substance would seem to import, that it is a deposition from the atmosphere, and this has been the generally received opinion respecting it, particularly among the ancient; it is an opinion still prevalent with husbandmen, who suppose it to fall from the heavens.

Honey-dew usually appears upon the leaves as a viscid, transparent substance, as sweet as honey itself, sometimes in the form of globules, at others resembling a syrup; it is generally most abundant from the middle of June to the middle of July, sometimes as late as September. It is found chiefly upon the *oak*, the *elm*, the *maple*, the *plane*, the *sycamore*, the *lime*, the *hazel* and the *blackberry;* occasionally also on the *cherry*, *currant*, and other fruit trees. Sometimes only one species of trees is affected at a time. The oak generally affords the largest quantity. At the season of its greatest abundance, the happy humming noise of the bees may be heard at a considerable distance from the trees, sometimes nearly equalling in loudness the united hum of swarming. The *lime* or *linden* tree has been regarded as doubly acceptable to the bees, on account of its fragrant blossoms and honey-dewed leaves appearing both together, and amidst the oppressive heats of the dog-days; but it seems doubtful whether the flowers have any attraction but their fragrance, as they are said to have no honey-cup. Some years do not afford any honey-dew; it generally occurs pretty extensively once in four or five years.

In a bee hive we have a representation of a republic, containing from ten to twenty thousand inhabitants. In this republican city, industry is the order of the day, and order and equality are every where observed. Their houses, or cells in the comb, are made of virgin wax, and these not only serve as the homes of the young bees, but as receptacles for their stores of honey. Between these combs there are streets wide enough for two bees to march, and there are also transverse passages or streets.

The working bees compose the most numerous part of the republic. To them is entrusted the defence of the city; they bring in the honey; build the cells, and nourish the young. They do all the offices of the hive; they fight against all intruding strangers, and, in short, attend to all the concerns of the State.

Drones are distinguished from the working bees by their larger size, and by their making more noise when on the wing. They die in July, and are carried out of the hive by the working bees.

Bees have their superior officers, whom they follow and obey in all cases. When one of these dies, if he be at the head of the government, all working ceases; the bees are no longer on the wing in quest of honey, but the whole city appears to be covered with mourning and confusion. The bees are seen through a glass hive, some standing in groups as if discussing the merits of the deceased, or the order of the funeral procession; while others, like guards, are walking to and fro before the passage. The funeral procession then takes place; the dead dignitary is carried in pomp out of the city; after which, they return more briskly to elect a new officer. When the new officer is elected, they proceed in the Turkish plan, to get rid of all who might attempt to usurp the government. Certain bees are appointed to go round and strangle all the rest of the royal blood in their cells. These curious proceedings have been observed through a glass hive. It has been observed that the bees invariably return to their labors, as soon as their new officer is appointed.

It is something remarkable, that the bee has two stomachs, in one of which is digested the pure honey, and in the other crude wax.

An *apiary* should be situated in a pleasant south direction. A valley is preferable to a hill, as the bees on their return to the hive can descend much more easily than ascend when loaded with honey. The hives should be situated where there are no bad smells, and near a stream of water where they can drink. Water appears to be a necessary ingredient in the production of honey. The hives should be placed in a spot surrounded by, or in the neighborhood of flowers and shrubby trees, from which the bees may obtain honey, on which they may settle when they swarm. Suppose a white clover field to the south of the hills, and south from the field a large garden, where hardy winter greens have been allowed to flower, as early food for the bees. White mustard should also be sown very early in patches near the hive; but not nearer than one yard. A few dwarf flowers may come within two feet, but tall grown ones would assist insects to get up. To the west, it would be desirable to have a shrubbery, a wood, a broomy common, or heather moor.

In the beginning of the fine season, when the bees can get food, or have stores remaining, the bee-master has nothing to do but to keep the ground about the hive clear from weeds, and from whatever might enable vermin to climb there. Yet as a thriving stock inclines very soon to swarm, the hives must be frequently looked after, from eight in the morning till five in the afternoon. The symptoms are generally thus: The little city seems crowded with inhabitants. They are continually in motion during the day; and after working time, they make loud noises. The drones may be seen flying about in the heat of the day, and the working bees go with a reeling motion and busy hum. When the bees come regularly out of the hives, let no noise, no interruption incommode them: but if they fly along, as if they were unsettled, some tinkling noise or the loud report of a gun, will make the fugitives repair to the nearest lodgings. If there is an empty hive with combs and some honey in it, they will readily go there. If a new hive is used, remember to smooth it well within, and singe off loose straws. Perpendicular sticks should never be employed. Four cross sticks at equal distances will support the combs. Old hives do very well for late swarms that are not to be preserved through the winter; but box hives are best for them, as the bees work fastest there. They are not, however, fit for being kept through the cold season.

It is to be observed that great haste in forcing a swarm into the hive may disperse them. Give them time to settle undisturbed, though keep a steady eye on their motions: but whenever they gather into a cluster, lose no time in placing the hive over them. If the swarm rest on any thing that can be brought to the ground, spread a clean linen cloth: lay two sticks on it, two feet asunder; lay the body on which the swarm have fixed, gently on the sticks; covering it with the hive by a motion the least perceptible; and taking care that the edges of the hive rests upon the sticks. Cover hive and all with a cloth; for the sun might allure the bees to rise again. When they have gone into the hive, cover it with its own board, and carry it cautiously to its station. Bees are apt to leave their hive even after they begin to work, so they must be watched till evening, and throughout the ensuing day. Whenever they are sure to remain, fix the hive to its board with a little lime round the edges; and crown it with green sods to keep out too great heat or rain.

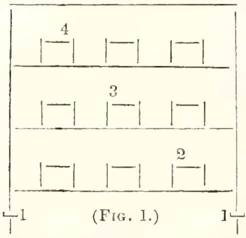
If a hive divides into two swarms, it is a sign that each swarm has a queen. Put each into old hives or boxes; but they must be kept separate. If a cluster of bees about the size of a small plum are seen together, the queen will generally be found there. Separate them, and with a drinking glass turned down, you may seize the queen. Put her, and a score or two of her subjects into a box full of holes, large enough to admit air, and yet not to allow the bees to escape. Feed her with honey combs, and keep her in reserve in case of the death of a queen in one of the hives. When a hive ceases to work, it is a sure sign the queen is no more. Then the bee-master may wait an hour and not see a loaded bee enter the habitation. But if the spare queen be taken late in the evening, wetting her wings to prevent her escape, and introduce her to the desponding society, they will receive her gladly, and begin to work.

If a hive fights among themselves, be assured there are two queens: and they will destroy each other, if one is not taken away to keep.

When bees are to swarm a second, or more times, they do not come out in clusters: but they make a sound called bellings, which may be heard; ceasing for a little, and renewed again and again. If there are different tones, it is certain there are several young queens in the hive. It is only by putting the ear close to it, that the sound can be heard distinctly. A western writer on bees says:

> Owing to the variety of seasons, to their enemies, and to many other circumstances, their complete successful management is difficult. The first method after bees had thrown off a swarm or two, (the second is always too weak without being joined to another swarm,) was to destroy the whole of the bees, either by water, smoke, or sulphur; this is now out of date, being too expensive an operation. The second method is, by taking the honey only in part, either by upsetting the hive and placing another of exactly the same size, and in its usual position, upon it, having a cloth wrapped round the joining, and gently knocking the lower hive, driving the bees into the upper one, and then cutting out a portion of the honey-comb of the lower one; or, by placing a small box or cap upon a hive just inhabited by a swarm, whereby the following season, the cap is found filled with honey. The third method is deserving, to those farmers who cannot commence on a large scale, of attention and practice, and is called the pyramidal hive; this is performed by first hiving a swarm in a square box, twelve inches each way, and smooth at top; in this the swarm is to remain till the following March; then is placed under it a box, exactly of the same size, its top being perfectly level, with a hole on the top, a little towards the front part, an inch and a half square, for a free passage from the top to the bottom; the nature of bees being at first to commence at the highest point and work downwards. The following year, in March, is placed under both, another box of the same size, and with the same hole for passage at top; in September, sooner or later, the working bees destroy the drones; then the upper box of all may be removed, and it will be found full of honey. Boxes should be placed on the stand only after sunset, or before sunrise; the boxes may be increased in size every spring, as the bees increase in numbers, and in wax and honey with time and space. By this plan, many swarms will be produced, to be hived and treated in the same manner; or by enlarging the boxes very much, the bees may be prevented from swarming, and the honey thereby increased greatly; when late swarms are weak, they may be put into a box before mentioned, and the hole on the top stopped up, and in the evening placed under another box to increase the family; it would only cause the death of one of the swarms; they will rise and unite easily. The fourth method is, to have a small frame-house, five feet by ten feet, with a door large enough for a person to enter it; within this, at a distance from the entrance, one or more hives are placed upon a bench; attached to the sides and roof of the building, are some strips of boards for the bees to hang their comb on; the door is well closed, and only holes left for the bees; when the bees swarm, they settle upon some part within, on the roof and sides of the building, and make comb, which may be cut off at pleasure by the owner; if hives are placed in a close house, or upon a frame stand, formed of two pieces of scantling, with legs, the corners resting on it, the bottom of the hives being open, they will contend with success against their greatest enemy, the miller, even if it had previously found a lodgement in the hives, and will always be able to prevent its ravages; hollow elder sticks, or corn stalks, put in the hives, as a covered passage for the bees, a little above the stand, has been found a partial preventative to the miller; or water sweetened with honey, or sugar and vinegar placed in a pan on the top of the hive, at night, attracts the moth, and it is drowned in it. A bee-house ought, in this country, to face the rising sun, which makes them go to work sooner in the morning, and the honey is not melted in the heat of the day, by the sun.

A Kentucky Bee house is thus described by Mr. C. Fisher, in the Farmer's Cabinet, June 15, 1839. It is recommended by competent judges as being highly commendable for its convenience and cheapness. The building is twelve feet long, eight wide, and seven feet high from the floor to the plate or ceiling, (the floor being eighteen inches from the ground,) and consists of four posts, eleven feet six inches long, let in the ground 3 feet, which is weather-boarded round, and covered in so as to prevent the bees from getting in the house, they being confined in six boxes, three on either side of the house, placed fifteen inches one above another.—This drawing (fig. 1) represents one side of the house, viewed from the outside.



(Fig. 1.)

Fig. 1, No. 1 1, are copper troughs running round the post, half way between the floor and ground, which are kept filled with water to prevent ants and other insects from getting in the house. No. 2, 3, and 4 are tubes eight inches wide, one-eighth of an inch deep, to convey the bees through the wall into the long boxes, and entering them at the bottom, there being three to each long box.

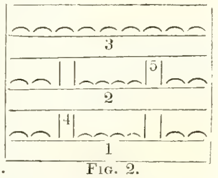


Fig. 2.

The drawing, fig. 2, represents one side of the house, viewed from the inside. No. 1, 2, and 3 are long boxes, eighteen inches wide and twelve deep, extending the whole length of the house, with eight holes, four inches square, in each box, upon which is set two gallon caps, with two half inch holes in each, one near the top the other about the centre of the cap, in which the smoke of a burning rag is blown to drive the bees from the cap into the long box, which can be known by striking the caps. When they are all in the long box, a knife or wire should be drawn under the bottom of the cap to separate the comb from the box, when the cap of honey may be removed, and an empty one put in its place. No. 4 and 5 are tubes three inches square, to convey the bees from one box to another, that one swarm of bees may do the whole, or if one or more swarms be put in each box, that they may become as one, as they will not permit more than one king when put together, by which they are prevented from destroying themselves by fighting. A house of this description, when the long boxes are filled, will afford, at a modorate calculation, ninety-six gallons of honey in the comb annually.

It is often necessary to feed bees in the fall or spring; boil sugar into a syrup, put it into a shallow plate or pan and cover it with paper full of holes, or linen, to prevent the bees drowning; place it under the hive. Hives should be well covered during the winter, bees being natives of a warmer climate; after a swarm is hived on a hot summer day, shade the hive with boughs, as the heat will often cause them to leave it; a late fall swarm may be preserved in fine health, all the winter, by setting the open bottom of the hive in a box of sweet dry oats, on which they will feed and do well; bees may be fed without any aid from honey, on pieces of raw chicken—they prefer any meat, fresh, juicy, and bloody; raw corn meal mixed with molasses is excellent, also light bread softened with molasses.* If bees are kept in a dark cellar through the winter, they will spend but very little of their stock of provisions, as they immediately become dormant until removed to another situation. Grove's patent fortified bee palace is constructed with ingenuity; but the most important improvement is in the construction of the bottom, which is formed by two boards set at a steep angle, like the roof of a house inverted, so that the offal dropped, passes off, and affords no opportunity for the lodgement of moths; there is also a guard which shuts at night and prevents their entrance. A good method to guard against the bee moths, is to place your apiary in a garret, or at such an elevation, as to be above their reach, as the insects are well known not to rise above twelve or fourteen feet from the ground; another good plan, is to have a lamp burning from sunset to sunrise, near the hives.

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* With the aid of feeding it is perfectly easy to bring any hive of bees through the winter; but to ensure the success of a very light stock, it is essential to keep it always warm and dry. Feeding is absolutely necessary when more honey has been taken than the hive can afford, by means of small hives or glasses. Such stocks as are intended to be kept through the winter should weigh twenty pounds or upwards, at the end of September, but casts and late swarms seldom attain this weight, unless two or more should have been united. The composition for feeding consists of moist sugar and new beer, the proportion of one pound of sugar to a pint of beer, simmered to the consistency of treacle: to be inserted into the hives, by means of small troughs, at night, and removed the next morning early. Should a hive be very poor and weak, it is better to feed in larger quantities each time.

To Unite Swarms, and Reinforce Stocks.—It is essential when there are weak swarms of bees, that they should be strengthened. The idea, so prevalent, of the greatest number of hives producing the most honey and wax, is erroneous; for a great part of the bees are necessarily employed in rearing the young, and therefore the number of those who are occupied in collecting honey is not near so great as has been imagined; for every swarm, the least as well as the greatest, is provided with a queen, equal in fecundity to the queen of the large stock, and as the brood she brings continually demands the labor and attendance of nearly half the bees, this circumstance renders the other moiety, from the smallness of their number, unable to accumulate a large quantity of honey in the short time it mostly abounds, and therefore honey cannot be obtained in glass hives or otherwise, but from a strongly-peopled hive.

Hive the swarms or casts in the usual way, and at about eight o'clock the same evening spread a cloth on the ground, near to the hive required to be reinforced; bring the new swarm, and strike it down rather hard, flat on the ground. The bees will then fall in a cluster; quickly place over them the stock to be reinforced; in ten minutes they will have united and become as one family, to be removed the same evening to its former situation.

Or, each cast or swarm may be hived separately. In the evening, turn the crown of the hive into a pail, and set the other hive exactly over it; in the morning, the bees from the bottom hive will have ascended.

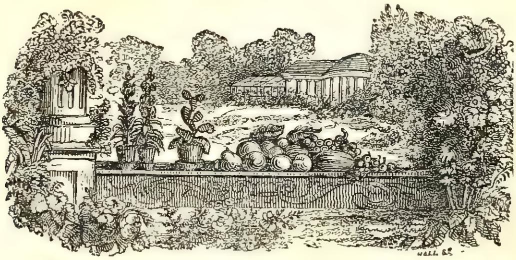
The system of uniting, so very important, is but little practiced, and has been overlooked by many cultivators; but it is absolutely necessary to have the hives well peopled and completely sheltered from wet, which are the principal and main objects to be particularly attended to in the art of bee keeping; and the advantages of uniting swarms will be found particularly beneficial in working the glasses with the newly invented double-topped hives.

Hives.—On this subject we might say a great deal, as much has been already said, written, printed and pictured, by numerous authors in their endeavors to settle the question of superiority among the various contrivances that have been offered to the public. We think we have presented all that is most material to be known and observed in the management of Bees, except a description of the *best kind of Hive.* This is omitted because we presume no one inclined to embark in the business will fail to visit the most successful apiary within reach, and inform himself by personal inspection, aided by opinions founded on experience, as to the pattern entitled to the preference.—There are Bee Palaces (Martin's) costing $25, and Bee Boxes (Hall's) to be had for about $3, with a variety of other "patents," all having their advocates and, doubtless, their advantages, which we have neither room nor inclination to notice, with a view to influence the reader in making a choice. Important improvements have been recently introduced, and hives may now be had which embrace every desirable advantage.

To Cure Bee Stings.—Chalk wet with hartshorn, or table salt, keep moist with water; raw onions are also excellent.

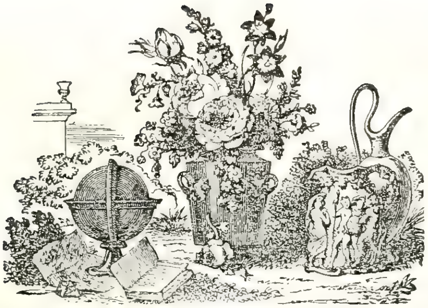
Silliman's Journal of Science gives the following extract of a letter from Dr. Austin Church of Cooperstown, N. Y.: "A young man in this place had accidentally overset a hive of bees, and before he could escape, they had settled, in great numbers, on different parts of his body and limbs and stung him severely. It was about half an hour after the accident happened, when he came to my office in great agony, and he had scarcely time to relate it before he fainted. I immediately applied Ammonia to the parts that had been stung—his legs, arms and breast. He directly recovered from his faintness, and experienced no pain or other inconvenience afterwards. It is several years since I first used the aqua ammonia, to counteract the effect of bites of insects and stings of bees, and it has invariably producd instant relief—generally complete.—I have often seen children crying in excessive pain from the sting of a bee, and on the application of the ammonia they would immediately cease complaining and become cheerful, so complete and sudden is the relief it produces. I always use it for mosquito bites, and they never trouble me farther. I was led to the use of it in these three cases, from the instantaneous effect it was said to have in counteracting the operation of prussic acid."

In the second number of the American Journal of Medical Science, (Phila.,) for last year, it will be seen that Dr. Moore of Alabama, used it with great success in the cure of bites of venomous serpents. From his account, it is probable, that the pure uncarbonated aqua ammoniæ is most efficacious. I have sometimes noticed that the application is more efficacious than at others, and I think it must be on account of its being sometimes carbonated and at others not.



FARMER'S GARDENS.

No class of men have it in their power to form and cultivate a garden at less expense than that of the farmer, but unfortunately, few farmers in this country have a taste for the subject; perhaps, because gardening is too like farming, to form a relief or change of occupation. A farmer's garden should be near the farm yard, for the convenience of the manure. In addition to the best common vegetables, a farmer's garden might contain without much trouble, attention or expense, those delicious (and if near a market, profitable) small fruits as Strawberries, Raspberries (red and white Antwerp) and Currants, red, white and black, with Melons, &c. Also, plum and choice peach trees, with some pear trees, particularly the winter pears. Some sorts of Grapevines, as the Catawba and Isabella, might be planted, and would well repay for their outlay and attention.



FLOWERS.

"What is the use of flowers?" exclaims a thrifty house-keeper, meanwhile polishing her fire-irons. What is the use of bright fire-irons, say we in reply, or of any fire-irons at all?—could you not make a fire on two stones that would keep you just as warm? What's the use of handsome table-cloths, and bed-spreads?—one might eat on a board, and sleep under a buffalo skin, and not really starve either!

When you see a house standing all alone, bare of shrub or flower, except some volunteer bunches of thistle or pig-weed, what do you infer of its inmates? And when you have passed even a log-cabin, where the sweet-briar is carefully trained around the door, while veils of morning-glories and of scarlet beans shaded the windows, did you not immedately think of the dwellers there, as neat, cheerful and agreeable?

This is more especially the case in regard to the homes of the poor. The credit of the rich man's grounds may belong to his gardener; but they who have no gardener, and whose simple flower-garden springs out of moments stolen from necessary labor, possess a genuine and cordial love for the beautiful, to render even an humble dwelling so fragrant and fair.

God might have made the earth bring forth
Enough for great and small;
The oak tree and the cedar tree;
Without a flower at all.

We might have had enough, enough
For every want of ours,
For luxury, medicine, and toil,
And yet have had no flowers.

The ore within the mountain mine
Requireth none to grow;
Nor does it need the lotus flower
To make the river flow.

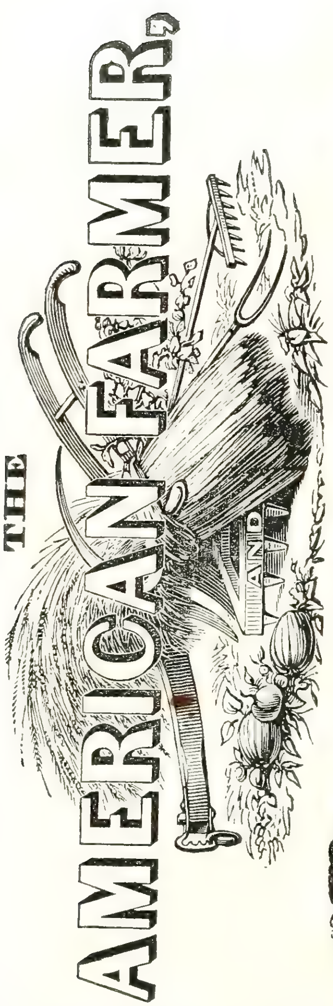
And clouds might give abundant rain,
The nightly dews might fall,
And the herb, that keepeth life in man,
Might yet have drunk them all.

Then wherefore, wherefore were they made,
And dyed with rainbow light,
All fashioned with supremest grace,
Up-springing day and night—

Springing in valleys green and low,
And on the mountain high,
And in the silent wilderness,
Where no man passeth by?

Our outward life requires them not;
Then wherefore had they birth?
To minister delight to man,
To beautify the earth—

To comfort man, to whisper hope,
Whene'er his faith is dim;
For whoso careth for the flowers,
Will much more care for him.



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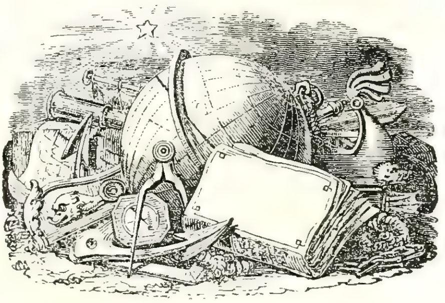
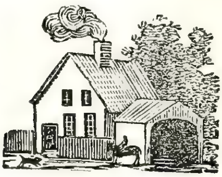
THE

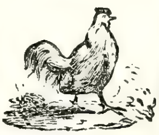
ROLLING YEAR,

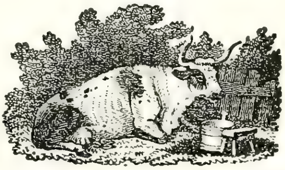
OR THE

FARMERS' CALENDAR.









JANUARY.

Then came old January, wrapped well
In many weeds to keep the cold away,
Yet did he quake and quiver like the quell
And blow his nayles to warm them if he may;
For they were numbed with holding all the day
An hatchet keene, with which he felled wood
And from the trees did lop the needless spray;
Upon a huge great earth-pot steane he stood,
From whose wide mouth there flowed forth the
Romaine flood.

Before we attempt to direct your attention to those duties which should command your supervision during this month, permit us to salute you, in the singleness of our heart, with our best wishes that you may enjoy a happy New Year, and that you and yours may live to enjoy health, prosperity and unalloyed pleasure, through many revolving ones. Having thus tendered to you the compliments of the season, it shall be our duty now, to converse with you a few minutes upon matters of business.

As you are about to commence the labors of a new year, would it not be profitable to examine the arrangements which you made, during the past one, to carry on the operations of your farm? We think it would, and that, by a careful and candid review thereof, you may find many errors to correct, and many of your plans susceptible of improvement.

If you have not done so already, provide yourself with a book, in which note down all the operations of your farm: the manner and time of preparing your ground: the time of sowing and planting your seed: the time of its coming up, its appearance during its progress to maturity; time of maturing, as well as of harvesting, each and every product of your farm; the kind and quantity of manure used, per acre, on every crop to which you may apply it; note down the effect of the different kinds of manure you may use: at the close of each week, record therein the work you intend having done during the ensuing one—this is an important disposition of time, and if faithfully carried out, will lead to the best results, as it will make you master of your business, and enable you to have it completely under your control, instead of being its slave. Plans thus judiciously arranged, place it in the power of a man always to have the command of his own time, and to keep his hands busy without being hurried. Keep also a record of the weather. In making these suggestions, it is not to be presumed, that we could sketch out all you ought to do; we shall, therefore, close the subject, by advising you, to *open your journal*, and shall rely upon your making it a source at once of pleasure and of profit, to which in after years you may refer with feelings of pride. With these brief preparatory remarks, let us look about us and see what is to be done

ON THE FARM.

The man who has had no practical experience, would but too readily conclude, that at this season of frost and snow, when the earth may be said to be locked up, that the husbandman has little else to do than to enjoy himself in luxurious ease upon the fruits of his last year's labors—occupy his time in the interchange of hospitality with his neighbors and friends—but he who makes such calculations of the farmer's life, bases them on foundations as fragile and unsubstantial as are the hopes of those who waste their time in fruitless searches after the philosopher's stone. For though the agriculturist who adopts a judicious system of operations, can always command his hours or days of recreation, to devote to the offices of friendship, or of good neighborhood, still such are the continuous calls upon his time, that even in the midst of his devotions to the claims of social life, his mind must be engaged in the furtherance of the duties of his calling—and it may often happen, that, when the air is most keen and nipping—when the weather is the most inclement—that his services may be most imperiously required. Thus situated, the mind of the skilful husbandman is always awake—ever on the alert—to turn the passing events of the season to the best account. But to such, there is this consoling reflection, that though it is in the nature of his vocation, to press him *onward*, such is the character of the excitement which it gives rise to, that his labors are so animated by the hope of reward as to be converted into sources of pleasure. But let us stop these reflections, and see what you should turn your attention to. Well then, after casting our mind about in search of the first object, it rests upon your

Grain Fields.—Have you carefully examined these, at intervals throughout the season, to see whether any obstructions were in the water-furrows, calculated to impede the free passage of the water? If you have not, do it without any farther delay. Let not your examination be a superficial one—and from this until spring, make a personal inspection of them every two weeks, and wherever you find clods of earth, sticks or stones, which may have fallen in, have them removed, as there is nothing like letting your *wheat* and *rye* plants have a dry bed to repose in during winter. We feel assured that if proper attention were paid to keeping the drains open, much of the freezing out would be prevented.

Fire Wood.—This is a favorable season for procuring a supply of fuel, to serve you not only through the winter and spring, but during the summer and fall. By doing so, you will study your interest, economise time, and not experience the mortification of having a part of your force diverted from field duties, to procure wood for the house in summer. The wood, when cut, should be hauled in without delay, and corded up near the house for use as wanted.

Winter Ploughing.—As there are many intervals of weather through the winter, when the frost is sufficiently out of the ground to enable you to have your stiff clays, intended for spring culture, ploughed, let us advise you never to let such an interval pass without putting every plough you can spare to work: and to *see*, that the ploughmen do their work as *deep* as the strength of your team will allow: don't be afraid of turning up the "*pizin*" of the subsoil.

Fencing and Lumber for Farm purposes.—This is the season when you should get all your *posts*, *rails*, and *other lumber* out, and we need scarce tell you, that after it is cut, it should be carted to the home enclosures, for the convenience of employing the hands in working it up during such wet days as they cannot be occupied in out-door work. From all such trees as may be felled for the purposes named, the bark should be stript off, as it will facilitate the seasoning of the timber, and prevent the ravages of the worm, by depriving them of a hiding place.

Fences.—A rigid examination of the whole of your fences should be forthwith made, so that wherever *new* may be required that it be supplied, and wherever *repairs* may be necessary, that they may be timely made.

Fence Corners.—Have all the bushes eradicated from your fence corners, as nothing bespeaks the neat and systematic farmer more than to see a clean line of fencing.

Gates and Bars.—If every field on your farm has not been already provided with a good substantial gate, have them made between now and the opening of spring, so that you may banish every pair of bars from off your place; see that your gates have good fastenings, that they open freely and can be closed securely.

Sheds for Cattle.—If you have already erected ample sheds to accommodate all your cattle, it will be of course superfluous for us to say any thing upon that head to you. But if you have not done so, let us then timely advise you to send a few hands into the woods to cut down the timber for their erection. A few days devoted to such work, and a few more to hauling it in and the erection of the sheds, will enable you to provide good dry quarters for your stock, a thing which every humane person will say should be done. In building your sheds, let them face the *south*, and their floors be somewhat higher than the yard, so as to preserve a dry surface.

Stables and Horses.—Taking it for granted that you have good warm, dry stables, we shall not say any thing about their construction; but it may not be amiss to admonish you of the necessity of having them daily cleaned out, so that your *horses* may be able to breathe pure air. Let your horses be provided with good beds of straw, that they may be refreshed by their slumbers. Stint them not in the quantity of straw for bedding, but recollect, that for every pound you give them for such purposes, they will return you *four*. Don't be content to tell your servants to attend to this duty, but *see* to it yourself. A daily visit to your stable, will tell you well for your interest at the end of winter, in the improved condition of your horses. *See* that their troughs are cleansed twice a week, by being washed with *ley* made from wood ashes; or with lime water. *See* that they are salted twice a week. *See* that they receive half a pint of linseed meal twice a month, and, if possible to do so, save, for the purposes of manure, their liquid voidings.

Grain in the Straw.—Get all that remains in this condition threshed out, and salt the straw as you pack it away.

Store Hogs and in-pig Sows.—Let these be cared for; keep them warm and feed them regularly.

Milch Cows.—As no man has a right to expect these animals to give either good or much milk, unless he feeds them well, we call upon you to see that in addition to *three good feeds* of hay or fodder, that your milch cows receive also due proportions of succulent food of some kind, and be sure to give them salt twice a week.

Oxen.—Let your work oxen be comfortably accommodated with lodgings, and well fed, in order that they may be the better enabled to sustain themselves in their toils, and be sure to give them each a handful of salt twice in each week.

Sheep.—Shelter and bed your sheep—feed them with hay and roots, or oats thrice, daily: salt them twice a week; keep a mixture of tar and salt in a trough where they can at all times get it; once a week throw them pine bows, and twice, daily, let them be watered.

Young Stock of all kinds.—Although we are opposed to *stuffing* young animals, yet we are as clearly of opinion, that they ought to be generously treated in their early growth, and, therefore, we advise every owner, to see that they are sheltered from the weather, have good lodgings, and are well fed. The animal which may be stinted in his food, or exposed to the inclemencies of the winter, never attains full growth.

Implements and Tools.—These, of every kind, should undergo a searching inspection: all that need it should be thoroughly repaired, and placed under cover, where they will experience no injury from the weather, and where they may be had when wanted for use. By attention to this duty now, you will save yourself much time, and prevent vexation in spring.

Gearing of every kind.—If you have not already done so, have every thing of this kind hunted up, carefully repaired and greased. And, by the way, one of the best substances we have ever used on leather gearing, consists of 1 oz. of India Rubber, dissolved in a pint of *Seneca Oil.* Let the India Rubber be cut into fine shreds, and after being dissolved in the oil, have the gearing well rubbed with it before a warm fire. This mixture, if rubbed on boots and shoes, will make them water proof, render the leather soft and pliable, and make the boots and shoes last as long again. We feel it due to the discoverer of the solvent, to say that it is Dr. G. B. Smith.

Composts.—Much valuable manure might be collected between this and spring, by collecting mould and leaves from the woods, and mixing it layer and layer about with the stable manure, or by mixing with each load of mould and leaves. one bushel of lime, and permitting it to remain in pile until spring. Any carts, horses, and hands, thus occupied, would be the most profitably employed on the farm.

We have, perhaps, thrown out hints enough as to the work on the farm, and it may now be well to see whether any thing, and what, can be done

IN THE GARDEN.

We are aware that there are but few gardens in the country, where much can be done during this month, as without the necessary appendages of hot-beds and glass frames, but few of the earlier operations of gardening can be advantageously carried on before the opening of spring. But still, with a little outlay of money, and some pains, a very passable hot-bed may be constructed, without glass, which will answer a good purpose in the bringing forward *cabbage, lettuce,* and other plants, for early spring setting out. The bed can be made in this way. Select a warm border *facing to the South;* then place two planks twelve inches wide, one after the other, against the fence, confine them with stakes, so that they will remain fast, then nail pieces of plank to either end, of the *width* you wish to make the bed, say three or four feet; then nail two other planks, in front, to these cross-pieces, so as to form a bed, and in order to strengthen the platform that is to be raised, nail another piece of board in the middle, where the four planks join together: then drive down three pieces of scantling, on short posts, in the backside of the bed, one at each corner, and one in the middle, so as to be twelve inches high; in front of the bed, and opposite each of these posts, drive down three others, which should be eighteen inches or two feet high; then nail cross-pieces from post to post, and finish your bed frame by placing, or nailing on a plank roof, the edge of the roof to project over on both sides, so as to convey the water off the bed; then fill up your frame with 8 inches of stable manure and four inches of rich earth or mould, rake it well, sow your *early cabbage, lettuce, tomatoes, radishes, egg-plants, cauliflowers, small saladings, and almost all other vegetables;* rake in the seed and press it down with the back of your spade. Cover the front and sides of this bed with straw matting, or any old rug, every night, and keep it covered whenever the weather is bad, and you may grow as many plants in this way as you please, which will prove many weeks more forward than any you could grow in open culture in early spring. The matting, or covering should be removed every good sunny day, but always put on again two or three hours before night. This is a very cheap manner of making a hot-bed, and will answer every purpose of the more expensive ones with glasses—it is one which any farm hand can make, and may be constructed at the cost of a pound of nails, a hundred feet of any kind of plank, no matter how old, half a day's labor, and the manure.

Gooseberry and Currant bushes may now be pruned of the old and decayed wood, and thus, may so much time be saved in the spring.

Stiff Beds.—If there be any stiff clayey beds in your garden, manure them freely; spade in the manure the full depth of the spade, and leave the bed, without raking to the action of the frost, which will not fail to improve its texture, by rendering it more friable. As soon in the spring as the frost is entirely out of the ground and the earth dried, rake such beds, then give them another *slight* dressing of manure, spade it in *half* a spat deep, rake well, and your beds will be in the best condition for fruitful cultivation.

Garden Tools of every kind must be looked up; if they need it, repaired, and put away.

We have thus endeavored to furnish you with a *remembrancer*, but have necessarily omitted many things—these you must supply by personal inspection of your entire farm and garden—trust to no one to do any thing for you that you can and ought to do yourself: *use your own eyes freely;* if they be a sharp-sighted pair, be assured that they are worth more to you than two pair of hands, and that, if you faithfully use them, you will be able to beget vigilance in all around you, and have the satisfaction to know that your own good example has been, to your interests, what the shield and the buckler were to the warriors of old—their protection and defence.

FEBRUARY.

——Then came cold February, sitting
In an old wagon, for he could not ride,
Drawne of two fishes, for the season fitting,
Which though the flood before did softly slyde
And swim away; yet had he by his side
His plough and harnesse fit to till the ground,
And tools to prune the trees, before the pryde
Of hasting prime did make them burgeon round.

The second month of a new year has come, and with it its various claims to call into requisition the time, the talents, the energies and industry of husbandmen. At all times February is to them a period of deep interest, because it invokes all to reflect upon the nature and extent of their operations throughout the season, while to some, in the more southern portions of our wide spread land, it is the time for active labor, in getting in their crops. But *now*, as things stand, with depreciated prices for every description of farm products, and but limited demands for even the best articles, the interest of all would seem to indicate, that the mind should be freely occupied in devising all possible means of economizing labor, in order that every unnecessary outlay of money may be avoided. Nothing must be bought that is not indispensably necessary to the convenience and comfort of the household, or for profitably carrying on, with vigor and intelligence, the operations of the farm, as it must be evident to all, that, until our country shall have been enabled to relieve herself of present difficulties, and the state of foreign markets shall have been greatly improved, that the surest field whence to *make* money, will be in *saving* it. When we speak of *economy*, we beg not to be understood, as recommending that niggardly policy, which a trite saying imputes to the merchant, who, to save a half penny lost his ship. What we do mean is this, that but few, if any, artificial wants should be gratified; while all expenditures absolutely essential to the success of the operations of the farm or plantation, should be freely and liberally made, whether those expenditures consist in the purchase and repair of agricultural tools and implements, the employment of force, or in the acquisition of knowledge connected with the business of agriculture. No man ever yet failed to gain by being master of the arts and mysteries connected with his calling, and it is certainly not claiming too much, when we say, that there is no occupation, among the whole range of man's pursuits, where more intelligence is required to conduct it *well* than in that of agriculture. He who looks upon it as a mere mechanical vocation, wherein the patient endurance of toil and drudgery, are the only qualifications required to fit a man to follow it, but displays his own ignorance and inability to judge with propriety. For although labor is one of its greatest essentials, the capacity to perform it stops short of those prerequisites, which enter into the qualifications of a good farmer. He should be acquainted sufficiently well with the principles of chemistry, to ascertain what kind of manure his soil may require, in what portions to apply it; what crops are best adapted to his soil and climate; to calculate with accuracy the cost of the culture of any particular crop, and its value in the market, in order to know whether he is gaining or losing by its culture; he should be able to tell by the texture of his soil, whether it needs draining; whether it be too porous and requires more tenacity imparted to it, to enable it to retain moisture, and what will be the best thing to be applied; whether it be too stiff, and requires disintegration, and if so, by what substance this object can be most efficiently and cheaply effected. These, and a thousand other things requiring *mind* to achieve, form part of the every day operations of farmers; and hence it should be their study to fortify themselves, by reading and study, to perform, and exact the performance of the mechanical portions of thier duties with neatness and despatch, and conduct with intelligence and skill those of a scientific character.

From what we have already said, the discerning husbandman will perceive, that the course of our remarks invite him to thorough reflection upon the year's labor now before him, to the adoption of systematic and efficient plans of operation, so that he may be the better prepared to meet the changed condition and circumstances of the times. Having thus completed this branch of our monthly conversation, we will direct your attention to certain things which may very advantageously be attended to

ON THE FARM.

Wood, Timber and Fencing.—If you have not already cut as much fire-wood, timber and fencing as will meet all your wants from now until late next fall, permit us to urge you to direct all your disposable force to the accomplishment of these objects, without further delay. Recollect that timber of all kinds, intended to last, should be cut during the winter months, when, as the saying is, the sap is down, and that if you do not complete it during this month no opportunity will present itself until the recurrence of winter again. But after you may have cut your fire-wood, *timber* and *fencing*, do not content yourself with simply having done so; but go to work and labor until the first is hauled into your yard and piled away, the second cut into lengths and placed to season, and the last wrought into posts and rails.

Fences.—Let it be your first duty after you shall have read this, to go round every pannel of fencing on your place, and note down all that needs renewing and such as requires repairing. This done, set your hands to work to supply both the one and the other. Don't say to yourself "Well, I'll do this next week!" Such delays grow into habits and entail lasting evils. Promptness in the execution of all things on a farm is commendable, but in nothing is it more so than in the renewal or repairing of fences. If you put off that which should be done to-day, until next week, it is more than probable that, before that time, you will have forgotten all about your fences, and think no more of them until your own or your neighbor's stock remind you by their depredations that your neglect had invited them to despoil you of the fruits of your labor.

Gates and Bars.—If you have *bars*, substitute gates for them, if you can without pecuniary inconvenience; if you cannot do so, see that your bars are fitted with good fastening pins, and that your hands put them in every time they go in and out. To the circumstance of a bar being left down, or a gate open, may be traced many of those trespasses from stock, which are at once the source of loss and mortification. If you would have well conditioned stock, you must keep good substantial fences, and gates or bars, and be sure to keep the latter always securely fastened.

Barns and Outbuildings of every kind should be thoroughly examined, and repaired if necessary; and after this is done, subject every thing in the shape of a house on the place to a complete cleansing, by white-washing. Besides the gratification which the eye will derive from the improved appearance, the health of the inmates, whether they be two or four legged, will be greatly improved. While the white-wash brush may be in hand, recollect, that the *inside*, as well as the *outside*, of all places requiring it, are benefitted by the liberal use of the brush—that a few hours expenditure of elbow-grease, and a small sum in lime, salt and glue, will give to your homestead an airy and beautiful aspect, while it will meliorate its healthiness.

Horses and Working Oxen.—It will doubtless appear obvious to you, that the better condition these animals may be in the spring, the better able will they be to meet the increased demands of the various labors peculiar to that season; and, therefore, let us advise you, to *see* that additional attention be paid, not only to their feeding, but to their comfort and cleanliness. It is not sufficient that a master may allow sufficient provender for his stock, but it is his duty, as well as interest, to *personally see* that what he allows, is given them, and that they receive it at regular hours of feeding; for it is a truth, that regularity is very important, both to the health and condition of all working animals. And while the prescribed attention be paid to their feeding, it is necessary too, that prior to each meal they should be watered—and that at least twice a week, a handful of salt, or salt and lime, or salt and ashes be given them, and also, that they receive each, once a week, a half pint of Linseed meal.

Milch Cows and in-calf Heifers.—These animals should receive increased attention, from now until the pastures of spring may render it unnecessary to yard-feed them. And in order to promote the secretion of milk, they should daily receive allowances of roots, or nourishing slops, in addition to their long feed. Nor should it be forgotten, that they require to have a gill of salt given them at least twice a week. And in order to prevent the hollow horn, a small portion, say a teaspoonful of spirits of turpentine should be put once a month in the cup, or cavity just behind the horns. To prevent or kill lice, let the back, from the back of the head, to the tail, be washed once a fortnight with *strong brine*, or a decoction of tobacco. We prefer the former.

In-lamb Ewes.—If you desire that these useful creatures should be in a condition to bring forth their young in safety, and suckle them afterwards, have a care to them now: see that, in addition to their hay or fodder, they receive each, per day, a gill of oats, or meal, or half a pound of roots, and above all things, see that they enjoy dry warm lodgings, and plenty of bedding, as also, a few pine boughs twice a week. Give them in a trough, a mixture of salt and tar, and be sure that they are regularly watered at least twice a day.

Sheep.—Your stock of sheep, generally, would be the better of the extra *bite* we have asked for the breeding Ewes; but if you cannot allow it to them, be sure to treat them, in every other respect, as recommended for the latter. You may rest assured, that well fed, and well attended sheep, yield the best and heaviest fleeces.

Swine.—Breeding sows, store hogs, and pigs, must be treated generously at this season of the year: give them plenty of food and water, at regular hours: provide them with good bedding, in warm dry pens; give them once a week a mixture of ashes and salt, as also a shovelful or so of charcoal—and above all, give them plenty of materials to convert into manure for you; among all animals, they are the very best manipulators of the food of plants.

Poultry of all kinds, should be fed at this season of the year, be provided with a supply of lime, and a small heap of ashes, or sand, to dust themselves in.

Colts and Young Cattle.—Whilst we are free to confess, that we are averse from the system pursued by some, of forcing young animals, yet we are believers in the doctrine, that they ought to be fed with a due regard to the satisfaction of their appetites, and the development of their frames and growth. To us it appears consonant to reason, that unless they receive sufficient nourishment to keep them in moderate flesh, to encourage the expansion of their bodies, and the growth of their muscles and bones, that the consequence will be, that they will be despoiled of much of their fair proportions, if not of the capacity for future usefulness. Hence then, it should be the policy of all owners of such young stock, to give them, daily, through this, and the ensuing month, a moderate quantity of grain, in addition to their long feed, and whether this addition be oats or corn, we think they would be the better if it were chopped.

Hauling out Manure.—As this is a tedious and heavy job, one requiring much time, we would advise you to commence hauling it out to your corn, and such other grounds, as you may wish to apply it to, as soon as you can conveniently do so, and in order to prevent any loss from evaporation, strew over each heap a tolerable covering of Plaster, which will prevent the escape of those gases which enrich the soil, that, otherwise, would be lost in the air. When the time shall arrive for spreading the manure, care should be taken to have it spread evenly over the whole ground, as there is nothing more beautiful than to see by the products of a field, that there is an equality of fertility in its various parts.

Carts, Tools and Implements.—Have you complied with our request of last month, to have every thing of this sort thoroughly examined and the necessary repairs made? If you have not, do it at once, as by so doing you will save yourself much trouble and vexation on the opening of the spring. One of the surest marks of a slovenly farmer, is, the habit of waiting until he may want to use a tool, a cart, or an implement, before he sees whether it needs repair or not.

Stiff Clays.—If you have any such lands, that you intend for spring culture, which you have not already had ploughed, seize the first open spell to have it broken up, as its exposure to the frosts will much improve its texture, make it comparatively mellow, and render it infinitely easier to cultivate.

IN THE ORCHARD.

Fruit Trees—Peaches, Nectarines, Apricots and Plums.—These fruits should, towards the end of the month, be pruned, (in any location south of the Susquehannah) care being taken, to do it before the buds start, or swell. Cut away only the dead, and such useless limbs as may crowd, too much, and retard the circulation of the sun and air through the branches. The roots of the Peach trees, just under the surface, and near the body, should be examined for *worms*, which should be taken out and destroyed, with the point of a knife or a piece of sharp pointed wire. The worms being removed, let the body and portions of the roots which may have been uncovered, be washed with a strong solution of potash and salt, and after restoring the earth, strew over the surface for three or four feet around the stem, a mixture of one part of salt petre to eight of salt, in the proportion of one pound of the mixture to each tree, and let the bodies, and limbs of the trees as far as they can be reached with the brush, be washed well with a strong solution of potash.

Apples, Pears and Cherries.—These may be pruned any time during this month; but all wounds from limbs cut off from these, as well as any other fruit, or ornamental trees, should be protected from the weather by a compost, which may be made of equal parts of Beeswax, Rosin and Fish Oil, or with equal parts of cow dung and clay, to be formed into a paste-like substance with human urine—or a thin mortar made with plaster will answer every purpose. Let the moss be well rubbed off the bodies of the trees if there be any upon them, with strong soap suds, in which enough potash has been dissolved to make the suds bear an egg—whether there be moss or not, the trees should be thus washed—or have a coat of paint composed of three parts of soft soap and one of flour of sulphur, to be put on with a paint brush. We should prefer the latter for apple trees, as it would prove a repellant of the borer.

We would here remark, that whenever a limb, whether decayed or otherwise, is cut off a tree, that it should be cut down close with its junction with the stem, and rendered smooth with a chisel, as it is important that the surface of all such wounds should be made as even as possible.

It is worthy of remark here, that although the growing of corn and potatoes among fruit trees, is of infinite advantage, that no small grain or grass crops should ever be cultivated among them: and where orchards are not cultivated, they should be ploughed two or three times a season.

We have, perhaps, said enough upon matters connected with the farm and orchard, and shall now direct you to others, commanding your attention

IN THE GARDEN.

Before we enter into the details, it may be worthy of remark, that the deeper the soil of a garden is dug, the more productive will it prove, and that it is useless to attempt to raise vegetables in perfection, without manuring with a liberal hand.

Grape Vines.—It is now time that all grape vines should be pruned. Let the knife be sharp, make a smooth cut, and stop the *bleeding* by a thick paste, to be made of Plaster, which must be put on immediately after the limb is cut off, care being taken to wipe the wound dry before putting on the paste. When you have the knife in hand, use it freely and boldly, and do not fear to take off or shorten too many limbs, as it is the wood of the current year alone that bears fruit.

Hot-beds, frames and lights.—Those who may desire to force plants for early transplantation in the spring, should, if they have not one already, provide themselves with a hot-bed with frames. One, to answer every purpose of the more costly fixtures, may be provided at but trifling cost, as the frame-work can be made by any farm hand, and the only expense of moment will be for the lights, and any old window sashes will answer. Let a frame be made of plank, say twelve, eighteen, or twenty-four feet long, as may be required, and four feet wide, to be as high again on the back as in front, so as to give the top a due slope to the sun, and to carry off rain. Let the joints be closely fitted, and to save the expense of tongueing, let a little mortar be pasted over the joints on the inside. Nail the back and front to corner posts, to be inserted in the earth, so as to give steadiness to the fixture. On this frame, fix any common window lights, so as to cover it. The frame being completed, put in as much fresh horse dung as will cover the bed six inches deep, then upon the top of this spread good rich mould to the depth of four inches: then rake the bed finely, and sow in sections thereof, such seeds as you wish to produce plants of, as cabbage, lettuce, tomatoes, egg plants, cauliflowers, &c. Rake the seed in, and press them down with the back of your spade; then put on the lights, which should be covered with matting, or old rugs, of a night; but should be taken off in the middle of the day in good weather. In fine days the lights should be raised an inch or two in front, so as to admit fresh air; but the frames must be covered always before night, so as to keep out the cold air. Gentle waterings are necessary to encourage the seed to vegetate and the plants to grow. Such a bed as we have described would produce plants enough for a large family, as well as for sale.

Should it be thought desirable, a portion of this bed, or a similar one to be made for the purpose, may be appropriated to the raising of early cucumbers, or melons, which can be raised by sowing the seed in small earthen pots, and sinking them up to the rim. When the weather gets mild enough, the pots must be raised, and the plants, earth and all, be turned out of the pots without disturbing the roots, into hills to be provided for the purpose. For a few days after thus transplanting them, the plants should be protected by some slight covering through the day, and at night until the weather becomes settled. When the plants have become firmly fixed in their new abodes, thin them out, so as to stand three in a hill, and henceforth treat them as such vegetables are usually treated in open culture. With little trouble, and no great expense, in this way, you may have cucumbers and melons fit to eat several weeks earlier than when planted in the ordinary way.

The hot-bed or beds should be made on the north border, facing the south, and the frame should be sufficiently far from the fence to allow of its being lined on the outside next the fence with a bed of fresh dung.

Peas.—All the early varieties of Garden, or Green Peas, may be planted at any time in the middle or southern States, after the middle of this month. They are a hardy plant and will bear snow and frost. To secure continuous supplies, it is best to plant them at different times, at intervals of two weeks apart. Thus managed, they may be secured fresh and young throughout the season.

Small Salading, of every kind, may be sown on warm borders as soon as the ground can be prepared, but should be protected for a short time by long straw, long stable manure, cornstalks, or matting.

Celery.—If you have a good warm, well protected border, facing the south, towards the latter part of this month, you may dung it well, dig in the dung deeply, rake finely, so as to pulverize the earth well, then sow celery seed thereon, which must be raked in, and be pressed down with the back part of the spade. This will give you an early supply of this most wholesome and excellent vegetable, the which, whether eaten raw, or served up in soups, is always acceptable to the epicurean taste.

Beets, Parsnips and Carrots.—These fine roots may be sown for early use, as soon as your ground is sufficiently dry to bear spading. But recollect, that you must manure well, and dig the ground deeply. If two spades deep, so much the better, as the deeper you dig, the longer, thicker and more luxuriantly will they grow. Be sure in digging, to have thin slices taken, and to make the spadesman rake every three feet. To ensure success, bear in mind, that you must *manure with a liberal hand, spade deep* and *thoroughly pulverize your ground.*

Cauliflowers.—The seed of this luscious vegetable should now be sown in hot beds.

Spinach, Lettuce and Radishes—May any time after the 20th of this month, be sown in open culture on warm borders, well protected, and facing the south, which borders must be generously manured and thoroughly prepared to receive the seed.

Cabbage seed.—You may sow cabbage seed in hot beds, for early use, any time this month, and the earlier the better.

Early Beans.—As soon as the weather will permit you to get the ground in order, the early varieties of beans may be sown: and as in the case of Peas you should continue to plant at intervals of a fortnight, for some weeks, so as to secure a continued supply.

Parsley, Thyme, Sage, &c., may all be sown as soon as the ground can be got in order.

Fruit Trees of all kinds in the garden should now be pruned, and treated as advised for those in the orchard. Let the ground be dug around them, and some well rotted manure and ashes be dug in.

Gooseberries and Currants.—If you have not already done so, prune your gooseberry and currant bushes now; and if you wish to multiply them, cuttings of the wood of last year's growth, if planted now, will take root and grow.

Raspberries should be pruned and tied up—and towards the last of the month new plantations from the runners may be made.

Annual Flowers.—The seeds of most annual flowers may be planted as soon as the ground can be got ready.

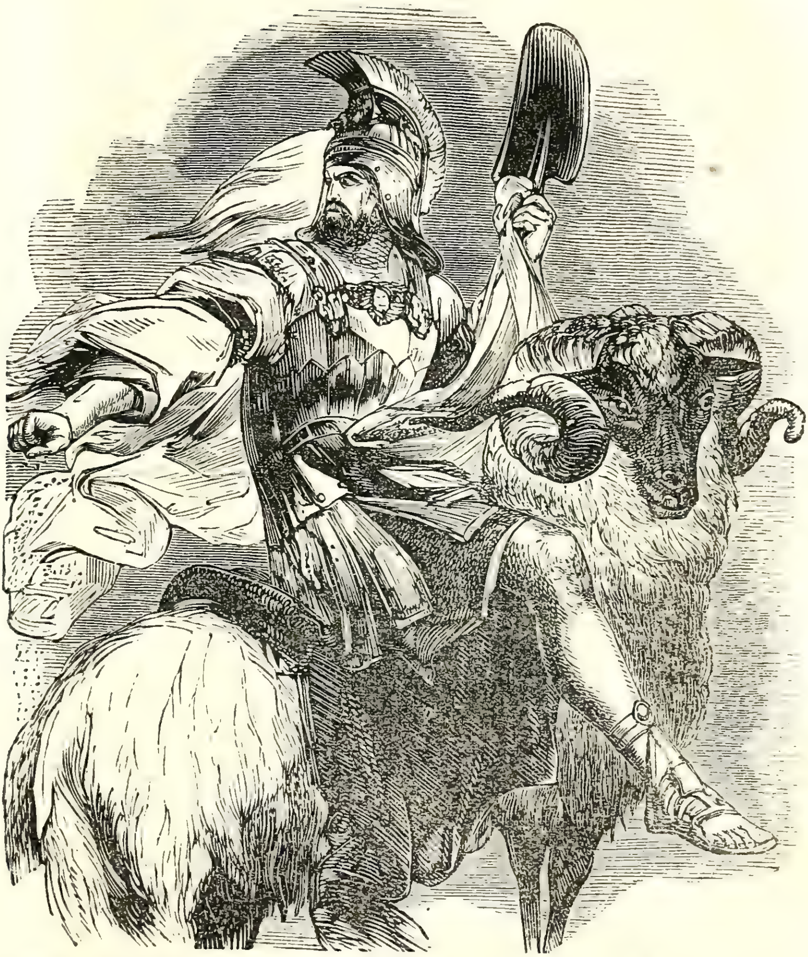
Herbaceous Flowering Perennials.—Plants of this family may be planted out as soon as the frost is out of the ground, and the earlier it is done, the more perfect and certain will be the bloom.

We have thus pointed out what ought to be done on the farm, in the orchard, and in the garden, and before we close, we have a word or two of advice to give to such of our readers as may stand in need of it. It is this—if you have not already a good garden, make immediate arrangements to have one the ensuing spring. Believe us, that there is nothing about the farm more profitable, or which tends so much to promote the comforts of the family—nor is there any thing better calculated to give a man caste among his neighbors and friends, than a well arranged and well filled garden.

But we have not done with you yet. Is your house well shaded by trees? If not, plant some.

Have you an orchard of apples and other fruits, as peaches, pears, &c.? If not, plant out this spring; for no man who loves his family—who studies their comfort, and is disposed to gratify his wife and daughters in a healthful luxury, should be without fruit of all kinds on his farm, or in his garden. Don't tell us, that they will take too long to come into bearing. Grafted fruit will yield in a very few years, and, therefore, it is the bounden duty of every American farmer and planter, to lay the ground-work of good orchards on his estate. It will make him prouder of his home, while it will compel his neighbors to think higher of his patriotism.

MARCH.



Sturdy March with brows full sternly bent,
And armed strongly, rode upon a ram;
The same which o'er Hellespontus swam—
Yet in his hand, a spade he also bent,
And in a bag all sorts of weeds—the same
Which on the earth he strewed as he went,
And filled her womb with fruitful hope of nourishment.

March is the *third* month of the year, with the ancients it was the first. The Romans named it from Mars, the god of war, because he was the reputed father of their first prince Romulus. The ascription of this month to Mars by the Romans, was a compliment to themselves; they were the sons of war, and might naturally deduce their origin from the belligerant deity. Minerva was also the patroness of March. Verstegan, writing of the Saxons, says:—"The month of March, they called *Lenet Monat*, that is, according to our new orthography, *Length moneth*, because, the days did then first begin in length to exceed the nights. And this *moneth* being by our ancestors so called, when they received Christianity, and consequently therewith the ancient Christian custome of fasting, they called his chiefe season of fasting the fast of Lenet, because of the *Lenet moneth*, whereon the most part of the time of this fasting always fell; and thereof it cometh that we now call it Lent, it being rather the fast of Lent, though the former name of *Lenet-moneth* be long since lost, and the name of March borrowed instead thereof. *Lenet*, or Lent, however, means Spring; hence March was the Spring month."

Before we begin our work for the month, it may not be unprofitable to ask our agricultural brethren, to thoroughly examine their arrangements, weigh well their force and means of carrying on their operations, in order that they may undertake nothing which they cannot do well. Success in farming, is only to be secured by timely conceived, well designed plans; and these must be executed with energy and skill. To undertake a large crop with small means, is like going to sea on short allowance, or committing your ship to the mercy of the waves without rudder or compass. Far better is it, at all times, to regulate the extent of your fields in cultivation, by your ability to cultivate them effectually, than by indulging in the vain ambition of being considered a large culturist, to put to hazard your prospects of success. It may be affirmed as an undeniable truth, that more real profit can be realized off of a hundred acres well manured and thoroughly cultivated, than there can be off of twice that quantity of land but indifferently manured, and as indifferently tended. Man, at best, however great may be his zeal, can only perform a certain quantum of labor; nor will the land, unless the utmost care be taken to preserve its fertility, yield but scanty products; hence then, every one should take especial care, that he put in no more of any crop than he possesses the means of properly maturing by attentive culture; nor should he put into cultivation any field, which may have been worn out, until he shall have taken steps to resuscitate it with manure, as such efforts only tend to excite the feeling of mortification, create disappointment, and encourage the expenditure of time and labor without the slightest chance of remuneration. In thus speaking of the unprofitable nature of such attempts, we desire it distinctly to be understood, that we do not wish to discourage efforts tending to the improvement of such soils. On the contrary, our every admonition and constant aim have been, to bring about a spirit and zeal upon this subject, worthy of the inheritors of such a country as ours. It is the *fruitless* efforts of hopeless culture, that we would discountenance—those efforts, which look to *rest* as the medicament of restoration of exhausted and worn-out soils; while those which, taking a more philosophic, a more rational view of the nature of soils, and which seek to impart to the earth the elements of renewal, in the form of manure, we have ever hailed with feelings of pleasure and gratitude; and would now, as we have ever done, invoke the owners of such lands, to make every laudable effort, consistent with their physical and moneyed abilities, to bring about a restoration of fertility. We are among those who believe, that even the poorest of such fields may be restored at an expense too small to discourage any one from encountering it. We have seen but few that lime, plaster and clover would not restore to a state that would bear a sod, without any thing else: but few, indeed, that plaster alone would not carpet with white clover. Who then, should despair? None but those who are too indolent to think and act; for he who knows any thing of the principles of vegetation, knows, that so soon as we can succeed in getting a good stand of grass upon our land, and have a good well set sward to turn in, that from that moment we may date its resuscitated condition, and calculate upon being remunerated for the cost and trouble of its culture.

Having thus far jogged on in our friendly chat, let us see what should be done

ON THE FARM.

Sowing Clover Seed.—The sooner you sow your clover seed on your winter grain, the better; but as it should be an object with you to cover it, we would advise you to harrow it in with a light harrow, and to follow that operation with the roller. Indeed, whether you intend to let your field remain in grass or not, an enlightened policy would dictate that you should sow clover seed on all your fields, as by next fall it would give you, if you should feel so disposed, an opportunity of ploughing in a fine clover ley, or if you should please so to do, you could turn your cattle in early fall, and be assured of a good pasture until frost. When we present these alternatives for your acceptance, we do not mean, that it should be inferred that we are of opinion, that it is best either to plough in the clover the first year, or that it should be grazed; for so far from either of these being our belief, we unhesitatingly aver, that we believe that the farmer will find his real interest in suffering his field to remain in clover untouched the first season, and only to turn it under after he shall have cut it two successive years, and that, looking to permanent benefit, he should let the after-math remain untouched by his stock.

In all cases where it may be considered desirable to provide a *pasture* for the stock, we think its quality will be greatly improved by sowing *orchard grass* with the cloverseed, *one* bushel of the former, to 12lbs. of the latter per acre.—If cloverseed should be sown alone, at least 16 lbs. per acre should be given to the earth.

Grass Seeds generally—as Timothy, Herdsgrass, Perennial Rye Grass, Orchard Grass, Lucerne, Saintfoin, and, indeed, all of the artificial varieties, may now be sown, and the sooner the better.

Hauling out manure.—As there is much to do at this season of the year, and time is precious, commence at once hauling out your manure, and cease not until you have hauled out enough to give your corn ground a generous dressing.—If after you examine your manure heaps, you should find you have not enough to do this, send your carts to the woods and haul in a sufficient quantity of loam and leaves to make up the deficiency; mix these with your dung, taking care to strew a bushel of plaster over every 10 or 20 loads of it, as the operation of mixing may be going on.

While upon the subject of hauling out manure to the corn ground, we desire to press this truth home—☞ *it is folly to expect a large product of corn without an abundant supply of manure.*

Oats.—We need scarce tell you, that the earlier you sow your oats the heavier will be the produce of grain, as you know that already; but it may be serviceable to remind you of what you have often done before, and perhaps are about to do now. If the piece of ground you have selected for your oat crop, is *poor*, don't be disappointed if your crop is of the same character. The slight which this excellent grain receives from almost every one, cannot be too severely reprehended. Generally speaking, some poverty stricken field is selected for its culture, and then, because the yield is small, the oat culture is denounced where the fault is with the culturists. Oats require good land, good preparation, and early sowing, and under these circumstances, in favorable years and situations, will prove a profitable crop. A hundred bushels to the acre have often been produced, forty, fifty, sixty and eighty, still oftener, and yet we doubt whether the average product in our country is above 15 bushels. Why is this thing so? the reason can be assigned in one word, and that word is, *neglect.*

Where the ground may not be good, in all cases a bushel of plaster to the acre should be sown and harrowed in with the seed. If plaster cannot be had, a few bushels per acre, say ten, of either lime or ashes will answer as a very excellent substitute.

To prevent injury from the *worms*, a bushel of salt, per acre, should be sown previous to rolling, and here we will remark, that all sowings of oats should not be considered completed until the field has been *rolled*.

As to the *quantity of seed* per acre we would remark, that the best crops that we have seen, and read of as having been grown, have always resulted from a heavy allowance of seed. *Three* and *four* bushels to the acre, in most instances, while the generally good crops have had 2 and 2½ bushels to the acre. Less than 2 bushels never should be sown, and great care should be taken, to select good heavy seed for sowing.

If clover seed be sown upon the oats, perhaps it would be best not to sow more than 2 bushels of seed per acre.

Corn.—As we are the advocates of *early* planting, we of course would urge upon all to get in their crops as soon as the frost is sufficiently out of the ground to allow of its being ploughed and put in good order. Deep ploughing, heavy manuring, thorough pulverization, in the preparation of the ground, and a dry bed, are indispensables in the beginning, as much so indeed, as constant stirring of the soil, is, in the after culture, up to the point of stopping. If we were asked, how deep we would plough for a corn crop ? our answer would be—never less than seven inches, and as much deeper as we could get, adding each year an inch or two to the depth of our soil ; always manuring, frequently with vegetable and animal manures, and never omitting either to lime, to ash, or to plaster.

Barley.—This is a grain entirely too much neglected in our country, and should be more generally cultivated. Besides its being in demand with the brewers, it is excellent feed for horses, cows, fattening bullocks and hogs. Its straw is relished by stock of all kinds ; it yields in suitable ground, from 20 to 40 bushels of grain to the acre, and is an excellent grain with which to sow almost any kind of grass seed.

The *soil* that it delights most in, is a deep loam, in good heart, or a rich sand, either of which must be dry ; and as clean culture is congenial to its thrift, it would be best that it should follow a corn or root crop.

The ground should be well ploughed and harrowed, so as to be in a fine state of pulverization. Being thus prepared, let the seed be sown thereon broadcast, at the rate of 2 *bushels* to the acre, then harrowed in lengthwise and crosswise, or ploughed in 3 inches deep. In the event of its being ploughed in, the ground must be subsequently harrowed ; and, finish by rolling. Good ground is essential to ensure complete success.

Old Fields—Those who may have old fields which, owing to their exhausted condition, have been turned out as unfit for culture, and who may not be in a situation to restore them by proper applications of nutritive manures, can, at a very little cost, if they be enclosed, bring them up to such a condition of fertility, as will make them worthy of tillage. Our manner of treating them would be this. As soon as convenient after we had got in our spring crops, we would spread over them, per acre, ten bushels of lime, and one of plaster. This done, we would run a heavy harrow over them two ways, so as to partially bury the lime and plaster, create a surface soil, and let the air, the rain, and the atmospheric gsaes, into the earth. By keeping the cattle off of them, by July, a covering of white clover will have sprung up, when we would flush up the fields tolerably deep, and sow buckwheat, at the rate of one bushel to the acre. When this should get into blossom, we would roll it down and plough it in. Upon this, in two weeks, we would sow wheat, if a stiff soil, or rye, if a sandy one, harrow either in twice, the way of the ploughing, and finish by rolling : and we would thus improve such old fields, with the confident assurance, that we would reap remunerating crops of grain.

The above course we would adopt if we required such fields for *culture ;* but if we wanted them only for *pasturage*, we would keep the cattle off the first season, and fully expect to find good grass the ensuing one, without doing any thing farther than liming, plastering and harrowing.

Clover Fields.—All clover fields should immediately have a bushel of plaster, per acre, sown over them.

Meadows, of all kinds, that may be turf-bound, should, as soon as the frost is out of the ground, have the harrow passed over them, so as to loosen up the soil and let the rains and atmospheric gases into the roots—and they would be greatly benefitted, by being top-dressed with ashes, or some rich compost.

Grain Fields.—Wheat and Rye would be greatly benefitted, as soon as the ground is dry enough to admit of it, by being harrowed and rolled.

Lime.—We have so repeatedly spoken of the advantages of liming lands which may be in need of calcareous matter, that we deem it almost superfluous to insist upon it here. But we will make a remark or two upon the subject. As almost every grain on analysis is found to contain more or less lime, and as the experience of the world bears testimony of its efficacy, we advise all who may not already have done so, to give to their arable lands a dressing of lime. If they cannot afford to put on 100 bushels to the acre, let them put on 50 bushels, and if that is beyond the ability of their pockets, let them put on 20, or even 10 bushels. It matters not whether the land be stiff clay, deep loam, or sand, each will be highly benefitted by its application—and of this they may rest contented—it will make their manure go farther, by making it last longer. If they have no lime, and can't get it, let them apply marl; if that is equally difficult of attainment, apply ashes; and if that is not to be had, burn clay, and apply its ashes.

We deem it worthy of remark, that in all small applications of lime, as *ten* or *twenty* bushels to the acre, that they should be repeated at intervals of one and two years, until each acre shall have received a hundred bushels—and that, in applications of marl, less than 50 bushels should not be applied at any one time and continued until between two and three hundred bushels shall have been put on.

Milch Cows.—As the season has arrived when you may expect your milch cows to bring forth their young, we would advise you to *see* that they receive increased care and an additional supply of food, and be sure that a portion of their daily allowance is comprised of such substances as the animals can readily convert into milk. As for making a good cow on *dry* food, or keeping her to her milk on it, there is nothing rational about it. He who expects good milk-yielding cows, must feed them.

Working Horses, Mules, and Oxen.—As the time has now arrived, when every muscle and nerve of these faithful creatures will be strained to their utmost in your service, *see* that they are cared for as the working animals of christian men should be. Let them be well cleaned twice a day, well bedded at night, and receive three generous feeds of grain through the day, and as much hay at night as they can profitably eat. Salt them twice a week: give them during this month a half pint of linseed meal twice a week, and a little hickory ashes, say a gill at a time, in their food, three or four days in succession.

Stock Generally.—Stock of all kinds must receive additional attention during this month, and each would be the better of a half pint of linseed oil and a gill of hickory ashes in a few of their feeds.

Sheep.—Be careful to give your ewes either grain or roots during this month; *see* that they are dryly lodged, well bedded, regularly salted, and have good fodder or hay; and while attending to your ewes, don't forget that the males of every description have appetities as well as they.

Root Crops.—If it be your intention to raise root crops this year, to provide a supply of succulent food for milch cows and sheep next winter, *now* is the time that you should be making the necessary arrangements, as providing the manure, selecting the ground, and securing the seed. Don't say that you have no manure to spare, for that is no excuse, as a couple of carts can haul enough loam and leaves from your woods in two days to manure as many acres of ground.

Implements and Tools.—Subject every thing of this description to a *thorough* examination—don't order it to be done, but do it yourself—and if any require repairs, have them repaired without further delay, so that they may be ready to work with when you want them.

Ashes and Plaster.—Secure a supply of *five* bushels of the former and *one* of the latter, for every acre of corn you mean to plant, so that you may be able to put a gill on each hill of corn. Small as this quantity may appear, it will make a difference of 25 per cent. in the yield of your corn.

Fences.—Let us enjoin it upon you as a duty that you owe yourself and your neighbors, to *see* that your fences are in good repair.

Orchards may be pruned the early part of this month.

Early Potatoes.—Let him who wishes to succeed with a patch of early potatoes, seize the first occasion when the frost is out of the ground, to get it ready. In the first place the ground must be well manured broadcast, ploughed deep and harrowed, then let the furrows be struck off 3 feet apart and 5 inches deep. In these furrows strew long manure, leaves from the woods, or pine shatters, say two inches deep, then plant your potatoe setts ten inches apart and cover them with long manure, taking care to sprinkle plaster over them. This done turn a furrow on either side and cover the potatoes, then roll in order to compress the earth.—Don't be alarmed about its being too early, the setts will not come up until nature teaches them they can do so with impunity from the frost. As soon as you see the potatoes begin to come up run your harrow across the rows, so as to level the earth and give the plants a chance of growing through a fresh stirred surface.—This will secure a full stand of plants.

When the plants are all up and 2 or 3 inches high, run a small plough through them, turning a furrow from them, and returning it by the return of the team.—In a week from this, run the cultivator through the rows so as to loosen and pulverize the soil: and as soon as this is done let your ploughman turn a small furrow towards the plants, taking care to throw his slice so as to leave a flat surface at top to act as a receiver of the rain. This ploughing completed, set careful hands in with a hoe to pick out any weeds which may not have been covered by the plough. In two weeks from this, subject your patch to the same process, and unless the season should be very wet, you may look upon the crop as laid by.—Should weeds however show their thankless heads, the hoe and cultivator must do the rest.

Parsneps, Carrots, and Beets intended for *early use,* may be sown as soon as the ground can be got ready in a dry condition.

Transplanting Fruit Trees.—Plant your young fruit trees out forthwith.

Pruning the Orchard.—Let this work be done early.

Ornamental Trees must now be planted.

As we have had a pretty free conversation upon the business of the *Farm,* let us consult together upon what work may be done

IN THE GARDEN.

Early Vegetables.—Prepare a bed on a warm, well protected border, facing the south, by manuring it heavily with strong stable manure, dig this in the full depth of the spade, rake thoroughly so as to break every lump and reduce the soil to the utmost fineness, then spread on a compost of well rotted manure, rake this in, then sow thereon seed of the following kinds, *early and late Cabbages, Lettuce, Tomatoes, Cauliflowers, Eggplants,* &c., then sow thereon, a slight covering of ashes, rake the seed in, and pat the ground down with the back of your spade. By doing this you will lay the ground work of a full supply of early plants of these several varieties of vegetables.

Should the fly, or other insects, attack the young plants, strew over your bed a mixture of ashes, soot, and flower of sulphur, four or five mornings in succession.

Cabbage Plants.—If you have cabbage plants growing in hot-beds, accustom them to the open air, so as to prepare them for being placed out as soon as the season will permit, which may be safely done any time after the middle of the month.

Peas.—The moment your ground will bear of being dug without clodding, prepare your beds for early peas. Fear not that the frost will injure them; they are hardy and stand the cold well. One of the most prolific crops we ever saw was caught by a March snow, which remained on the ground for many days without injuring the Peas in the least. Peas, as you know, require a deep loam or rich sandy soil; they should be covered about two inches deep in the rows, and the rows 4 feet apart. By continuing to sow every ten days, for a month, a continued supply of this delicious vegetable may be secured.

Beans.—The Windsor, Mazagan, and Lisbon kinds of Beans, may be planted as soon as the ground is rid of the frost. The earlier they are sown after that the more luxuriantly will they produce.

Setting out Plants.—Almost every kind of plants will be the better of being transplanted into open culture early; so, therefore, as soon as the frost is out of the ground, go to work and set them out.

Radishes.—Sow Radish seed as early as you can get the ground ready, and do so at intervals of ten days during the season, so as always to have a fresh supply of crisp, young and tender ones.

Spinach.—Seed of the spinach must be sown early.

Carrots, Parsneps, and Beets.—Seed of these roots cannot be sown too soon, if you wish to have a supply of early ones for table use and market.

Small Salading and Herbs.—Seeds of all kinds of small salading and Pot and medical Herbs should now be sown, in order to have them in perfection.

Celery.—Prepare a bed and sow celery seed forthwith, and the plants will be ready to set out in May.

Broccoli.—Get ready a part of your border, and sow Broccoli seed. Let the bed wherein you plant them be well manured. Prepare your bed as we have advised for Early Cabbage, Lettuce, &c. and you need not fear a failure.

Kale or Brussels Sprouts.—In order to provide yourself with a supply of these delicious sprouts, prepare yourself a bed in an open unshaded part of your garden. Manure it liberally, dig it deep and pulverize the surface by thorough raking; then sow your seed as you would turnip seed, and rake it in; it requires no other culture, and will yield you a rich return in most delicious sprouts.

Dressing Asparagus Beds.—Spread a compost of well rotted dung and ashes on your asparagus beds, fork it in with a garden fork, say two or three inches deep, then rake your bed and sow thereon a small quantity of salt.

Planting out new Asparagus Beds.—New plantations of this vegetable should be made early this month. In selecting a spot for your bed, choose a deep sandy loam, which is neither wet nor too dry. Spread thereon manure four inches in depth, dig this in fully ten inches deep, rake fine, and then spread thereon well rotted manure, mixed with ashes, abuot 2 inches deep; dig this in half spade deep and rake. Then follow the following plan in forming your bed:

Divide your bed into 4 feet wide with alleys, 2 feet wide. Strain your line along the bed 8 inches from the edge, then with a spade cut a small trench or drill close to the line, about 6 inches deep, making that side next the line nearly upright; and when one trench is opened, plant that before you open another, placing the plants upright against the back of the trench or drill, so that the crown of the plants may also stand upright, and 2 or 3 inches below the surface of the ground; then let them all be placed an equal depth, spreading the roots out regularly, against the back of the trench, at the same time drawing earth around them with the hand as you place them in position. When the plants in the row is finished draw earth over them with the rake, then open another trench 10 inches from the first, and so continue until the bed is completed. The rows must be 10 inches apart, and the plants stand 10 inches asunder.

When your plants come up keep them free from weeds, and continue to do so through the season.

Sowing Asparagus Seed.—Prepare a bed 4 feet wide, by manuring freely, digging deep and raking, then sow your seed *thinly*, either in drills, or broadcast. Water the plants occasionally in dry weather, keep the plants clear of weeds, and in one year they will be fit to be planted out into permanent beds.

Onion Seed may now be sown in drills, in a rich loamy bed, previously manured and prepared. Let the drills be a foot apart, and when the plants come up thin them out, so as to stand 3 or 4 inches apart, keep the earth clean and well stirred, avoiding to cover up the roots, and you will have onions this season as large as usual.

Seed Onions.—Plant out your seed onions.

Parsley, Thyme, Sage, Chives, Leeks, Shallots.—All herbs of this kind may *now*, either be set out, or the seed sown. They will each form a handsome edging for your beds, and it would be best to cultivate them there.

Garlic.—Prepare a bed four feet wide and transplant young bulbs.

Early Turnips.—If you desire to have early Turnips, select a good loamy bed, manure freely with cow dung, say 3 inches deep, dig this in 7 or 8 inches deep—the full depth of the spade at all events—rake fine, and put on a compost of well rotted manure and ashes, rake this in freely, then sow your seed, first having soaked, it in train oil 12 hours and dried it in ashes or plaster. Your seed sown, rake it in lightly, and finish by patting the earth with the back of a shovel, spade, or board. When the first plants come up, sprinkle over them, from a mop, train oil, and over that sow ashes. The after culture must be the same as fall turnips. We have always found the Dutch turnip answer best for early sowing.

Early Potatoes.—The earlier you get these in the better; as to the mode of culture we refer you to our directions for growing them under the Farm head.

Salsify.—Sow the seed of this vegetable as soon as the frost is out of the ground. They must be sown in drills 6 inches apart.

Artichokes.—Seed of this root may now be sown, and the beds where they may already have been planted should be dressed.

Red Peppers, any time after the middle of this month, up to the 1st of the next, seed may be sown.

Horse Radish.—Set out beds of these as soon as possible.

Rhubarb or Pie Plant.—The roots of this must be set out as early as possible.

Fruit Trees of all kinds should be set out as early as possible: those requiring pruning should have that operation forthwith performed.

Grape Vine Cuttings should be put out immediately.

Gooseberries and Currants.—Thin out these and make new plantations of the cuttings.

Raspberries.—Tie up your raspberries, prune off the old wood and set out the runners.

Strawberries.—Dress your strawberry beds.—The easiest plan is to cover the beds with straw; set it on fire, then dig over the beds, and when the plants are up, give them a dressing between the rows, and place long straw thereon. The straw should be confined by pegs to keep it from blowing away. It will preserve moisture, keep down the weeds, and render the berries clean of grit and dust.—In dry weather strawberry beds should be watered.

Shrubbery of all kinds must now be trimmed, and all transplantations made at as early a period of the month as possible.

Annual Flower Seed, of almost every kind, should now be sown.

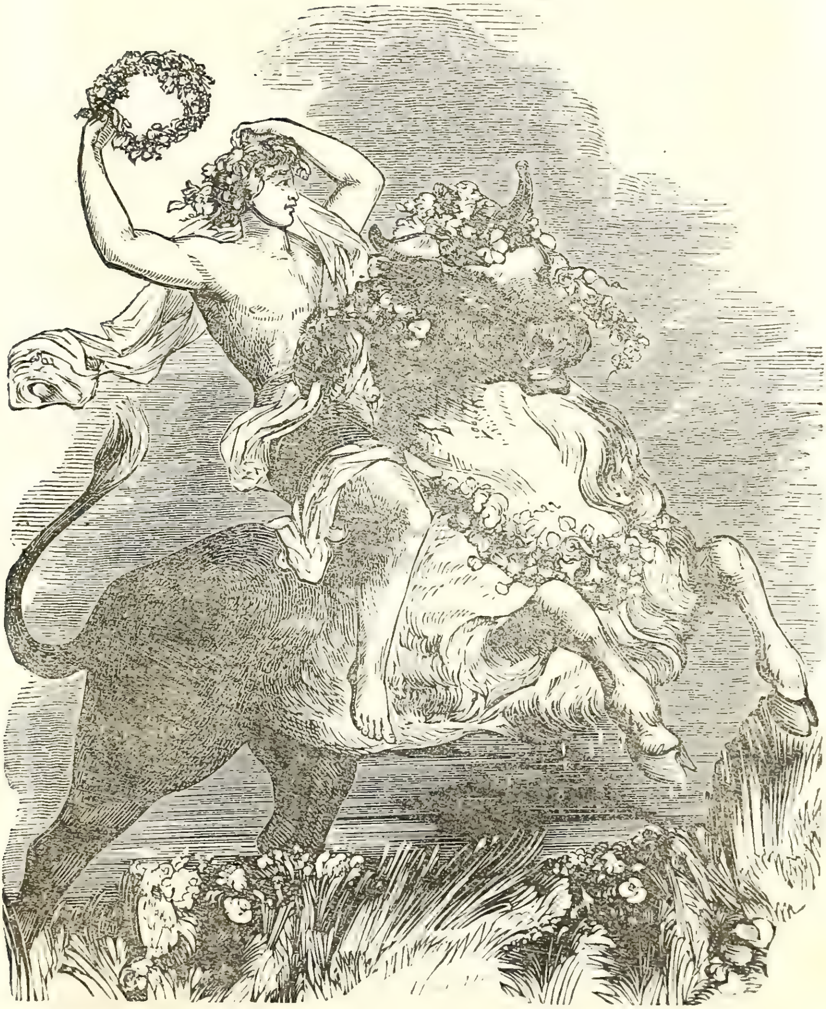
Cucumbers.—The best soil for forcing, a desirable thing to get them early into market, is one half vegetable mould or black earth, one sixth of well rotted manure, one third of rich top earth from an upland meadow, with a small quantity of sand. You may begin to force in February or early in this month. The short prickly is best for early fruit, and the long prickly for the chief early and summer crops. Seed is better three or four years old. A good plan to raise cucumbers is to put a peck of dry leached ashes in each hill, and cover them with a small quantity of earth. It will raise in the driest seasons fine thrifty plants.

To force Cucumbers.—Get a quantity of fresh horse dung with the litter; in four days cover it two inches thick with good earth, over this a bell glass or hand glass; two days after sow the seed; cover with the glass and put over at night a mat. In four days the plants will come up. Make them a bed with other manure three feet thick, cover it with good earth three inches thick, then put on the frame and cover, and cover at night with mats. When the bed is hot enough, the young plants must be removed to it. Water them with warm water, and earth them up as they increase. In a month the flowers will appear. The heat necessary is sixty-five degrees. The dung should be heaped and stirred a month before, and kept between wet and dry with water, if necessary. Another plan is to make a hole under a warm fence, and put in a little hot dung; put on earth six inches deep. Sow the seed and cover it at night with old carpeting having first bent some hoops over it. Before the *rough* leaf comes, plant two in a little flower pot, and fill as many as you please. Have a large bed ready to put the pots into, and plunge them in. When the plants have two rough leaves out, pinch off the *shoot* in the middle. When the cucumbers in the natural ground come up, turn out the *ball* and fix it in a hole in good rich ground. They will bear a month sooner by these means. Water the plants. Have only one plant in a hill, it will be much more fruitful than two. For chief summer crop make squares of six feet in well dug earth.—In the middle of each dig a hole fourteen inches deep, fill this with well-rotted dung, and sow on it five or six seeds; cover with mould; draw out, when they come up, all but two in each hill. Sow in the beginning of May—for pickles sow in July. For seed, chose the largest, let them grow quite yellow, pick them and set them up on end in the sun for two or three weeks. Cut them open and, wash out the seeds. Spread them to dry and harden. It is thought to be a preventative to the unhealthy influence of cucumbers to cut the slices very thin, and drop each one into cold water as you cut it. A few minutes in the water takes out a large portion of the slimy matter, so injurious to health. They should be eaten with high seasoning.

Cucumbers to pickle. Cucumbers should be in weak brine three or four days after they are picked: then they should be put into a pail of clear water, and kept slightly warm in the kitchen corner for two or three days. Then take as much vinegar, as you think your pickle jar will hold; scald it with pepper, allspice, mustard seed, flag root, horseradish, &c., if you happen to have them; but half of them will do. Throw in a bit of alum as big as a walnut; this serves to make pickles hard. Skim the vinegar clean, and pour it scalding hot upon the cucumbers. Brass vessels are not healthy for preparing any thing acid. Red cabbages need no other pickling than scalding, spiced vinegar poured upon them, and suffered to remain eight or ten days before you eat them.

We have thus endeavored to sketch out a brief memoranda of the things which should be attended to this month in the garden, and we will conclude, by enjoining it upon you, as a duty, to personally inspect every operation to be performed therein. Trust to no laborer however competent or faithful he may be, and believe us when we tell you, that your *presence* will make the best more faithful to his trust, more vigilant in the discharge of his duties, and more attentive to your interest.

APRIL.



Next came fresh April, full of lusty hood,
And wanton as a kid whose horne new buds;
Upon a bull he rode, the same which led
Europa floating through th' Argolic fluds:
His horns were gilden all with golden studs,
And garnished with garlands goodly dight
Of all the fairest flowers and freshest buds
Which th' earth brings forth; and wet he seem'd in sight
With waves, through which he waded for his love's
delight.

April is the fourth month of the year. Its Latin name is *Aprilis*, from *aperio* to open, either from the opening of the buds, or of the bosom of the earth in producing vegetation. The Saxons called it *Oster* or *Eastermonath*, in which month, the feast of the Saxon goddess, *Eastre*, *Easter*, or *Eoster* is said to have been celebrated. April is sometimes represented as a girl clothed in green, with a garland of myrtle and hawthorn buds;

The space occupied by our remarks with respect to the work to be done "*On the Farm*," in the preceding month, precluded us from paying attention to that which belonged to the garden; but as this spot is too sacred in our eye to be neglected, we devote a larger portion of our space to it now, and fain would impress upon the minds of our readers, its direct and positive importance, not only as a means of comfort, but of economy also, in the domestic arrangements of the homestead. By proper attention and arrangement in the details of a garden, of an acre in extent, we are very sure that it can be made to yield more than any other five on an estate devoted to farm-culture. We say this without the least regard to location and to markets, as we hold it to be perfectly demonstrable, that whatever of luxuries or necessaries which may be raised in a man's garden, whether consumed in the family or sold, should, to the full amount of their value, be credited, less the cost of culture, to the ground on which they may have been grown. Upon mere notions of economy, every man should raise full supplies of vegetables for the consumption of his family and dependants, as the more of these eatables which may be consumed, the less will be the demand upon his meat barrel or smoke house, as let philosophers say what they may, the human stomach can only hold a certain quantum of food, and vegetable, sby their power of distention—by their capacity to fill up a vacuum—exercise a most important influence in satisfying the cravings of hunger, be it whetted ever so much by a keen and eager appetite, as their givings out of healthful stimuli, in the process of decomposition in the stomach, are as well calculated to sustain the muscular energies of the body while at labor, if not more so, than animal food; for among the hardiest, most faithful and enduring of European laborers, we find those whose diet is chiefly vegetable.

But separate and apart from mere considerations of profit—a home in the country, is no home, in the broad sense of the term, unless it have, as one of its appendages, a well arranged, well filled, and well cultivated garden; the absence of which casts a dreary gloom, a desolate appearance, even over the most beautiful natural advantages of site, no matter how embellished by mansion or out-houses, as it shows with more than the force of the meridian light, that the owner is without taste, and what is worse than all, that he cares not for that cherished ambition, which every farmer-wife and daughter entertains, to see her home alike the abode of elegance and of plenty.

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holding in one hand primroses and violets, and in the other the zodical sign, Taurus, or the bull, into which constellation the sun enters during this month. The Romans consecrated the first of April to Venus, the goddess of beauty, the mother of love, the queen of laughter, the mistress of the graces; and the Roman widows and virgins assembled in the Temple of Virile Fortune, and disclosing their personal deformities, prayed the goddess to conceal them from their husbands.

In this month the business of creation seems resumed. The vital spark rekindles its dormant existence, and all things "live, and move, and have their being." The earth puts on her livery to await the call of her lord; the air breathes gently on his cheek, and conducts to his ear the warblings of the birds, and the odor of new-born herbs and flowers; the great eye of the world "sees and shines" with bright and gladdening glances; the waters teem with life; man himself feels the revivifying and all-pervading influence; and his

——spirit holds communion sweet
With the brighter spirits of the sky.

With these remarks we turn to the duties to be performed

IN THE GARDEN.

Peas.—If you have not already sown your early Peas, for the use of the table, and for market, bestir yourself and get them in without delay. Give them a moderately rich bed with a warm southern exposure, have that bed moderately manured, well dug, thoroughly raked, and let your seed be of an *early* variety, and you may prepare your palate for a treat of lamb and peas in a very few weeks: and at the time of committing this early kind to the earth, take care to have a like quantity of *Marrowfats* also sown, so that when the first shall get into the "sear and yellow leaf," the latter shall be ready, and at hand, to continue this delicious and grateful delicacy.

Beans.—All and every variety of this excellent, substantial, old fashioned vegetable, may now be planted, and as its culture has been rendered classic by the generous deeds done in its behalf, from the planting of the colonies, up to the present time, we shall not stop to state how they should be planted, but will content ourself, by enjoining it upon all, to plant some of each kind.

Cauliflowers.—Those who wish to enjoy this luscious vegetable in perfection next fall—those whose ambition is warmed into a spirit of rivalry, to out-do their neighbor in its production—must say nothing about it to that neighbor, but go right to work and prepare a bed at once, on some border facing the south. Its preparation is simple; it consists in manuring, digging and raking fine. While the bed is preparing, soak your seed in a solution of *soot and salt* for a few hours, then drain them and dry them with plaster, when they must be sowed, raked in, and the bed patted with the back of the spade. If the weather should be dry after the seed are sown, water it twice a week with soap suds, until the plants come up, and until it rains. The suds will not only act as a powerful manure to the young plants, but serve to protect them from the fly.

Thus you may secure yourself a supply of plants, which will be ready for transplanting in May, and will be sufficiently in flowers in October to enable you to enjoy a dish worthy of any one who has a soul to enjoy a good thing.

Cabbages.—As soon as you can prepare a plant bed, do so, and sow the various kinds of cabbage seed, both early and late, not forgetting that among the latter the *Savoys* holds among epicures the highest place, and that, in addition to the delicious richness of their flavor, they are the very hardiest of all, and keep sound through the frosts, thaws and sleets of winter.

As the cabbage plant, like every thing else that has life and virtue, has its enemies, prepare for their attack by making before hand the following solution:—Take 8 lbs. of tobacco stems; put them into a hogshead half filled with water; then add 2 lbs. of flour sulphur, tied up in a bag, and a peck of soot. In 48 hours the solution will be sufficiently strong for use. As soon as the cabbage plants come up, water them with this solution, and continue to do so daily for a week or two, when the fly will have ceased to trouble them. The solution is eminently nutritive as well as stimulative, and will make the plants grow finely. The seed, before being sown, should be soaked in a solution of warm water and saltpetre, for twelve hours, and when about to be sown, should be dried in plaster: 2 oz. of saltpetre to 1 gallon of hot water, will be sufficient for the purpose of soaking as many seed as you may require. In sowing, treat the seed as directed for cauliflowers.

Early Turnips.—Prepare a deep rich, loamy, or sandy bed, for turnips. Spread a thick coat of cow dung over it, say from 3 to 4 inches deep; spade it in, after chopping the dung fine, a spade deep; then make a compost of well rotted dung, in the proportion of three parts dung to one of spent ashes, spread this about an inch thick over the bed and rake it thoroughly; when your bed will be ready to receive the seed. For 12 hours before you sow, your seed must undergo the following preparation:—Make a solution of hot water, salt, and saltpetre, three parts salt to one of saltpetre, with water enough to cover the seed; put the seed in this solution, and let it remain an hour, then take it out, put it into some tight vessel, and pour fish oil over the seed, so as to cover them; let the seed remain in the oil for eleven hours, then drain off the oil, and dry the seed with either ashes, plaster, or lime, then sow them, rake them lightly in, and pat down the bed with either the back of a shovel or spade. When the plants first come up, water them with a solution of tobacco, soot and water, and as this is being done by one person, let another dust newly slaked lime over the plants.

Early Potatoes may now be sown; but recollect that, if you want them *early*, you must give them substantial fare, whereon to live sumptuously; for you may take our word for it, that potatoes are like the epicurean tribe, they delight in good eating, and plenty of it.

Carrots and Parsnips.—Of these sow a small bed for early use; and don't forget to try the *white Carrot.*

Beets.—Now is the time to drill in your table beets—manure well, turn in the manure in thin slices, rake well, then sow your seed. But, before you either sow parsnip, carrot, or beet seed, soak them well in a solution of soot, salt and hot water; then drain, and dry them in ashes, lime or plaster. The blood red beet, is, beyond question, the most popular garden beet known among us; but then, from an experience of some years we have come to the conclusion, that it is inferior in richness and delicacy of flavor to the sugar beet. The deeper you dig for beets, as well as all other roots, the longer, straighter, and sooner will they grow.

Celery.—The seed of this fine vegetable should be sown immediately. Prepare the bed as follows:—Dig for this purpose, a bed of rich, light earth, rake thoroughly, then sow the seed thereon with a free hand, rake it in lightly. In dry weather, water the bed moderately, every other day, before and after the coming up of the plants. The best kinds, are, probably, the *solid* and *red stalked,* both of which are very fine, and blanch delightfully.

Now as we have jogged your memory about celery, don't forget to sow some seed: it is a delightful vegetable, and as healthful as it is delightful. When the plants are up, keep them free of weeds, and, as we have before told you, be careful to water them in dry weather.

Peppers.—Seeds of this must be sown, so as to have plants ready for transplantation in May.

Spinach, and small salading, of every variety and kind, must now be sown.

Onions, Garlic, Leeks, Chives, Shallots, Parsley, Thyme, Sage, Summer Savory; in fine, all the pot and medicinal herbs, must now be sown or planted out.

Asparagus Beds.—If these have been hitherto neglected, you should, without further delay, dress them—taking especial care to do it effectually.

Strawberries.—Cover your strawberry beds, if not cleaned yet, with dry straw, an inch deep, and set it on fire. This will destroy all the trash thereon, as grass and weeds and the seeds of each. Let the beds then lay a few days until the strawberry plants show their heads above ground, then between the rows put on, about an inch thick, a compost of lime, ashes and mould, dig this in with a small lady's spade, or fork, then rake, and finish by covering the alleys between the plants, either with tanner's bark, or long straw. If with the latter fasten it down with pegs, so as to prevent its being blown off. This dressing will make your vines bear much more luxuriantly, and you will have the satisfaction to have fine large berries clean of dirt and grit.

Radishes.—Sow radishes immediately, and continue to do so every week for several weeks to come. By this means you will be able to have them crisp and nice throughout the season.

Tomatoes and Egg Plants.—Sow the seeds of these as early as possible—a delay of a week may be dangerous.

Salsafy or Vegetable Oyster, and Okra.—The seeds of these vegetables should be immediately planted.

Flowering and other Shrubs intended to be removed, or planted out, should be, without further delay, as the earlier they are fixed in their new homes, the better will be their chance of doing well.

Lettuce may now be sown or transplanted.

THE BIRDS OF SPRING.

BY WASHINGTON IRVING.

My quiet residence in the country, aloof from fashion, politics, and the money market, leaves me rather at a loss for important occupation, and drives me to the study of nature, and other low pursuits. Having few neighbors, also, on whom to keep a watch and exercise my habits of observation, I am fain to amuse myself with prying into the domestic concerns and peculiarities of the animals around me; and during the present season, have derived considerable entertainment from certain Social little birds almost the only visitors we have, during this early part of the year.

Those who have passed the winter in the country, are sensible of the delightful influence that accompany the earliest indications of spring; and of these none are more delightful than the first notes of the birds. There is one modest little sad-colored bird, much resembling a wren, which came about the house just on the skirts of the winter, when not a blade of grass was to be seen, and when a few prematurely warm days had given a flattering foretaste of soft weather. He sang early in the dawning, long before sunrise, and late in the evening, just before the closing in of night, his matin and his vesper hymns. It is true, he sang occasionally throughout the day; but at these still hours, his song was more remarked. He sat on a leafless tree, just before the window, and warbled forth his notes, free and simple, but singularly sweet, with something of a plaintive tone, that heightened their effect.

The first morning that he was heard was a joyous one among the young folks of my household. The long, death-like sleep of winter was at an end: nature was once more awakening; they now promised themselves the immediate appearance of buds and blossoms. I was reminded of the tempest-tossed crew of Columbus, when, after their long, dubious voyage, the field-birds came singing round the ship, still far at sea, rejoicing them with the belief of the immediate proximity of land. A sharp return of winter almost silenced my little songster, and dashed the hilarity of the household; yet still he poured forth, now and then, a few plaintive notes between the frosty pipings of the breeze, like gleams of sunshine between wintry clouds.

I have consulted my book of ornithology, in vain, to find out the name of this kindly little bird, who certainly deserves honor and favor far beyond his modest pretensions; he comes like the lowly violet, the most unpretending but welcome of flowers, breathing the sweet promise of the early year.

Another of our feathered visitors who follow close upon the steps of winter, is the Pe-wit, or Pe-wee, or Phœbe-bird; for he is called by each of these names, from a fancied resemblance to the sound of his monotonous note. He is a sociable little being, and seeks the habitation of man. A pair of them have built beneath my porch, and have reared several broods there, for two years past, their nest being never disturbed. They arrive early in the spring, just when the crocus and the snow drop begin to peep forth. Their first chirp spreads gladness through the house. "The Phœbe birds have come!" is heard on all sides: they are welcomed back like members of the family; and speculations are made upon where they have been, and what countries they have seen during their long absence. Their arrival is the more cheering, as it is pronounced, by the old weatherwise people of the country, the sure sign, that the severe frosts are at an end, and that the gardener may resume his labors with confidence.

About this time, too, arrives the blue-bird, so poetically yet truly described by Wilson. His appearance gladdens the whole landscape. You hear his soft warble in every field. He sociably approaches your habitation, and takes up his residence in your vicinity. But why should I attempt to describe him, when I have Wilson's own graphic verses to place him before the reader?

When winter's cold tempests and snows are no more,
  Green meadows and brown furrowed fields reappearing,
The fishermen hauling their shad to the shore,
  And cloud-cleaving geese to the fields are a steering:
When first the lone butterfly flits on the wing,
  When red grow the maples, so fresh and so pleasing,
O, then comes the blue-bird, the herald of spring,
  And hails with his warblings the charms of the season.

Then loud piping frogs make the marshes to ring;
  Then warm glows the sunshine, and warm glows the weather;
The blue wood and flowers just beginning to spring,
  And spice wood and sassafras budding together:
O, then to your gardens, ye housewives, repair,
  Your walks border up, sow and plant at your leisure
The blue bird will chant from his box such an air,
  That all your hard toils will seem truly a pleasure:

He flits through the orchard, he visits each tree—
  The red flowering peach, and the apple's sweet blossoms
He snaps up destroyers, whatever they be,
  And seizes the caitiffs that lurk in their bosoms:
He drags the vile grub from the corn it devours,
  The worms from the webs where they riot and welter,
His song and his services freely are ours:
  And all that he asks is, in summer a shelter

(2)

The ploughman is pleased when he gleams in his train,
Now searching the furrows, now mounting to cheer him;
The gard'ner delights in his sweet, simple strain,
And leans on his spade to survey and to hear him.
The lingering school boys forget they'll be chid,
While gazing intent, as he warbles before them,
In mantle of sky blue, and bosom so red,
That each little loiterer seems to adore him.

The happiest bird of our spring, however, and one that rivals the European lark, in my estimation, is the Boblincoln or Boblink, as he is commonly called. He arrives at that choice portion of the year, which, in this latitude, answers to the description of the month of May, so often given by the poets. With us, it begins about the middle of May and lasts until nearly the middle of June. Earlier than this, winter is apt to return on its traces, and to blight the opening beauties of the year; and later than this, being the parching and panting and dissolving heats of summer. But in this genial interval, nature is in all her freshness and fragrance; "the rains are over and gone, the flowers appear upon the earth, the time of the singing of birds is come, and the voice of the turtle is heard in the land." The trees are now in their fullest foliage and brightest verdue; the woods are gay with the clustered flowers of the laurel; the air is perfumed by the sweet-briar and the wild roses; the meadows are enamelled with clover blossoms; while the young apple, the peach and the plum begin to swell, and the cherry to glow among the green leaves.

This is the chosen season of revelry of the Boblink. He comes amidst the pomp and fragrance of the season; his life seems all sensibility and enjoyment, all song and sunshine. He is to be found in the soft bosoms of the freshest and sweetest meadows; and is most in song, when the clover is in blossom. He perches on the topmost twig of a tree, or on some flaunting weed, and as he rises and sinks with the breeze, pours forth a succession of rich tinkling notes, crowding upon one another, like the outpouring melody of the sky-lark, and possessing the same rapturous character. Sometimes he pitches from the summit of a tree, begins his song as soon as he gets upon the wing, and flutters tremulous to the earth, as if overcome with ecstacy at his own music. Sometimes he is in pursuit of his paramour; always in full song as if he would win her by his melody, and always with the same appearance of intoxication and delight.

Of all the birds of our groves and meadows, the Boblink was the envy of my boyhood. He crossed my path in the sweetest weather, and the sweetest season in the year, when all nature called to the fields, and the rural feeling throbbed in every bosom; but when I, luckless urchin, was doomed to be mewed up, during the live-long day, in that purgatory of boyhood, a school room, it seemed as if the little varlet mocked at me, as he flew by in full song, and sought to taunt me with his happier lot. Oh, how I envied him! No lessons, no tasks, no hateful school, nothing but holiday, frolic, green fields and fine weather. Had I been then more versed in poetry, I might have addressed him in the words of Logan to the cuckoo:

Sweet bird! thy bower is ever green,
Thy sky is ever clear;
Thou hast no sorrow in thy tone,
No winter in thy year.

Oh! could I fly, I'd fly with thee;
We'd make a joyful wing.
Our annual visit round the globe,
Companions of the spring.

Further observation and experience have given me a different idea of this little feathered voluptuary, which I will venture to impart, for the benefit of my school boy readers, who may regard him with the same unqualified envy and admiration which I once indulged. I have shown him only as I saw him at first, in what I call the poetical part of his career, when he in a manner devoted himself to elegant pursuits and enjoyments, and was a bird of music, and song, and taste, and sensibility, and refinement. While this lasted, he was sacred from injury; the very school-boy would not fling a stone at him, and the merest rustic would pause to listen to his strain. But mark the difference. As the year advances, as the clover-blossoms disappear, and the spring fades into summer, his notes cease to vibrate on the ear. He gradually gives up his elegant tastes and habits, doffs his poetical and professional suit of black, assumes a russet or rather dusty garb, and enters into the gross enjoyments of common vulgar birds.

He becomes a bon vivant, a mere gourmand; a thing of nothing but good cheer and gormandizing on the seeds of the grasses on which he lately swung, and chanted most musically. He begins to think there is nothing like the "joys of the table," if I may be allowed that convivial phrase to his indulgences. He now grows discontented with plain, every day fare, and sets out on a gastronomical tour, in search of foreign luxuries. He is to be found in myriads among the reeds of the Delaware, banqueting on their seeds; grows corpulent with good feeding, and soon acquires the unlucky renown of the ortolon. Wherever he goes, pop! pop! pop! the rusty firelocks of the country are cracking on every side; he sees his companions falling by thousands around him; he is the reed bird, the much sought for tit-bit of the Pennsylvanian epicure.

Does he take warning and reform?—Not he!—He wings his flight still farther South, in search of other luxuries. We hear of him gorging himself in the rice swamps; filling himself with rice almost to bursting; he can hardly fly for corpulency. Last stage of his career, we hear of him spitted by dozens, and served up on the table of the gourmand, the most vaunted of Southern dainties, the rice bird of the Carolinas.

Such is the story of the once musical and admired, but finally sensual and persecuted Boblink. It contains a moral, worthy the attention of all little birds and little boys; warning them to keep to those refined and intellectual pursuits which raised him to so high a pitch of popularity, during the early parts of his career; but to eschew all tendency to those gross and dissipated indulgences which brought this mistaken little bird to an untimely end.

Which is all at present from the well wisher of little boys and little birds.

GEOFFREY CRAYON.

Gooseberries, Currants, and Raspberries.—These should be forthwith trimmed of superfluous wood, and any new transplantations, contemplated of either, cannot be too speedily made.

Melons, Squashes, Cucumbers, &c.—Plant the seeds of all and any of these, any time after the middle of the month.

Nasturtium.—Sow the seed of this early as possible, as the bean takes long to mature itself.

Flower Seeds of all kinds, whether annual or otherwise, should be sown as early in this month as the beds can be got ready.

Flower Plants and Roots, with but few exceptions, may be safely confided to the earth.

Jerusalem Artichokes.—The seeds or bulbs of this root may be placed in the ground any time this month, but the sooner the better.

Cabbage.—The varieties are many; the soil suitable for their cultivation is strong, rich and substantial, inclining rather to clay than to sand—they require (to be very fine) a great deal of manure, and free from shade; for winter cabbages, the latter part of April is early enough to sow the seed; afterwards transplant the best; if a hot sun causes them to droop, stick two shingles in the ground, to shelter them from the South East and South West side; plant two and a half feet each way for the smaller kind, and three feet for the larger, with a dibble; moist weather is the best; plant deep; hoe the ground while the dew is on, once a week, until they begin to head; surround the plant with a ring of lime to prevent the ravages of the blackish brown worm, called by some the cut worm, or endeavor to find it near the plant and destroy it; to destroy the lice, water with soap suds, or a little weak salt and water; the under leaves may be given to cattle, but not in too great quantities, when fattening, as it will give the flesh a rank and strong flavor; a similar objection exists against feeding them otherwise than sparingly to milch cows. The field cabbage is only the large Scotch.—Pinch off the top root before planting, and dip the root and stem in muddy water to guard against drought. Sow a belt of hemp seed around your cabbage ground, and the caterpillar will not touch the cabbages.

In the very nature of things, we have omitted many things of moment which ought to be attended to. Look us over carefully; note our remarks, go into your garden, and, with *your own eyes,* discover our omissions and supply our deficiencies. Notwithstanding the Mesmeric art, we must yet believe, that no one can think so effectually for another, as that other can for himself, and the longer we live, the more confirmed are we in the propriety of an early formed opinion, that no one's eyes can see so clearly the true interests of a farmer, in the garden, and on the farm, as those provided by nature for himself. Therefore, look and see, that whatever ought to be done, is done, and done too, in the proper time and manner.

MAY.

Then came faire May, the fayrest mayd on ground,
  Deckt all with dainties of her season's pryde,
And throwing flowers out of her lap around:
  Upon two brethren's shoulders she did ride,
  The twines of Leda, which on either side,
Supported her, like to their soveraine Queene.
  Lord! how all creatures laught, when her they spide,
And leapt and danc't as they had ravished beene!
  And Cupid selfe about her fluttred all in greene.

May is the fifth month of our year, but the third of the Roman. The name is supposed to be derived from Maia, the mother of Mercury, to whom the Romans offered sacrifices on the first day of the month; but various other derivations have been assigned to it. Vestegan affirms of the Anglo-Saxons, that "the pleasant moneth of May they termed by the name of *Trimilki*, because in that moneth they began to milk their kine three times in the day."

Scarcely a poet, but praises or describes, or alludes to the beauties of this month. Darwin sings, May has come with all its fond recollections to the old, and soul-stirring anticipations to the young, of pleasures past and to be enjoyed. The trees are bursting into leaf, and the fields are assuming that inspiring livery, which tells one, that life is not to man alone, and though his is eternal, that the same kind Providence, which unfolds to him the pathyway of bliss, superintends, with a parent's care, the most insignificant plant that derives its nurture from the earth. Thus are we taught a lesson that each may turn to his advantage, if he be disposed to profit by its moral; as it shows, that though the seasons may be backward, and winter, with its chilling aspect, intrench upon the balmy air of Spring, it is in the power of the Great Source of Good, as it is his pleasure, to vouchsafe a bountiful harvest to the husbandman who may be entitled to it. But he who would be ensured against the accidents of flood and field, and deserve those beneficent smiles that sweeten the toils of life, and lend enchantment to labor, must be worthy of them. If, by the unpropitious state of the weather, we have been prevented from getting our grounds in readiness for planting as early as we could have desired, let us not repine; it is the pleasure of Him who knows what is best; and a consciousness that such is the case, should inspire us not only with a spirit of patient resignation, but it should fill us with that lively sense of gratitude, whose home is in the deepest well-springs of the heart—those pure fountains—those living reservoirs—from which gush, in limpid streams of thankfulness, offerings that are acceptable and holy, because they are guileless and sincere. Let us, then, throw our regrets for the past to the winds; look forward with that hope, whose assurance is based on a determination to exert our energies and our industry, in a way to merit it, and the time is sufficient for the harvests to be abundant and the garners to be filled.

Indulging in such feelings, armed with resolution, and animated with the buoyant hopes of success, let us as friends consult and reason together, with respect to what we must now attend to

ON THE FARM.

Corn.—In the culture of corn as with that of every other cultivable product, the husbandman always finds his interest promoted, by paying every possible care to the preparation of his ground; and certain are we, that, so far as the product of corn is concerned, it is greatly increased by attention in this particular.

Born in yon blaze of orient sky,
Sweet May! thy radiant form unfold,
Unclose thy blue voluptuous eye,
And wave thy shadowy locks of gold.

For thee the fragrant zephyrs blow,
For thee descends the sunny shower;
The rills in softer murmurs flow,
And brighter blossoms gem the bower.

Light Graces dressed in flowery wreaths,
And tiptoe joys their hands combine;
And Love his sweet contagion breathes,
And laughing dances round thy shrine.

Warm with new life the glittering throngs,
On quivering fin and rustling wing
Delighted join their votive songs,
And hail thee, goddess of the Spring!

Milton says that Adam, discoursing with Eve,

Smiled with superior love, as Jupiter
On Juno smiles, when he impregns the clouds,
That shed May-flowers.

The frolic wind that breathes the Spring
Zephyr, with Aurora playing
As he met her once at Maying.

The first of his "sonnets" is to the nightengale warbling on a "bloomy spray" at eve, while as he figures,

The jolly hours lead on propitous May.

We think we would not be chargeable with a desire to exaggerate the quantum of advantage, were we to say, that 25 per cent. of increase may be thus effected. But while we urge home the necessity of thorough and deep ploughing, and complete pulverization of the soil, let us be permitted to impress upon your mind, that, to ensure a large yield, generous manuring is indispensably necessary; and that the after culture should be so cleanly, as to look to the extermination of all weeds and grass; for if the latter be permitted to partake, in common with the corn-plants, of the food provided for them, and to share with them in the occupancy of the ground, a greatly diminished yield of grain will be the inevitable result. With these suggestions, and referring you to our remarks upon this head, in April, we will pass on to

Oats.—This grain should not only be in, *but up;* but as it is possible, that there may be some who may not have sown their oats, though it is late to do so now, yet we would advise all, who may not have done so, to dash on and sow them forthwith, as the season may so turn out, as to make the late sown produce good crops. If it should prove a cool one, there can be no doubt of such result.

Before we close our remarks, as we apprehend there is a possibility that many farmers may have not been able to get in their oats, or a less quantity than usual, we would suggest that, for purposes of *feed* for their horses, they have still time to provide very excellent substitutes. Either *Millet or Buckwheat* make excellent feed, when ground, for all kinds of stock, will go quite as far, bushel for bushel, is equally nutritious, if not more so, and will impart the capacity to endure labor in an equal ratio.—The hay of the buckwheat—or straw if you please—well cured and salted, we know, from experience, to be as good as any other kind for milch cows—while that of Millet is equal in quality, for any kind of stock, to any other hay whatsoever. If cured with the seed appended, two tons are equal to three of any other kind for all the purposes of imparting strength, or contributing to the purposes of fattening.

Fall Potatoes.—Towards the middle of this month, prepare your ground, and plant your fall potatoes. In the preparation of the ground, spare no pains to have it ploughed of good depth and made fine of tilth. In *cutting* your potatoes, see that every set has two eyes. As you cut them, sprinkle plaster over them, so as to coat over the cut surface. In *planting*, be sure that you give a most liberal allowance of strong coarse manure. If you have not a supply in your barn yard, go into your woods, and thence haul leaves and mould. With these *mix* a bushel of plaster and ten of ashes, to every twenty cart-loads, and you will have a most excellent substitute for either barn yard or stable manure. When your potatoes first begin to come up, run the harrow over them, it will break the ground, let the plants through easily, and tend very much to ensure regularity in their coming up.

The after culture.—As soon as the plants are up and about three inches high, take a furrow from the row and throw it back on the return of the plough: in a week from this, set your plough in, and give the vines a slight *flat* hilling: if necessary, let the hoemen follow the plough to cut out such weeds as the plough may not have covered: in two weeks from this, give another hilling with the plough, increasing the size, but continuing its flat shape. In most seasons, *two* such workings will answer, but should the weeds get ahead, the *cultivator* and hoes may very advantageously be set to work to extirpate them. *Distance of rows*—2½ or 3 feet apart.

Worms.—The worms sometimes attack potatoes and destroy the vines. On the first indication of their existence, mix one bushel of salt and one bushel of lime together, then sow this quantity per acre on the vines in early morning, while the dew is on.

He that wants to ensure a full crop of well grown and thoroughly ripened potatoes, should plant from the middle to the 20th of the month; though we have known a very fair crop made from a planting in June.

Pumpkins.—Plant your pumpkins as soon as you can—*plant a plenty of them*, and keep them clean while requiring culture. No man who makes butter for sale, should feel satisfied until he had planted several acres of pumpkins every spring. Pumpkins are good alike for the table, and for stock—therefore, we say again to you—*plant pumpkins.*

Mangel Wurtzel and Sugar Beets.—It is now time for you to put in these roots—their culture is the same as the garden beet. He that may have twenty milch cows and will take the trouble to put in an acre of each of these varieties of the beet, in ground well manured and prepared, may be sure to provide them with plenty of good succulent, milk inducing, and cream secreting food, to carry them through the winter and succeeding spring. And as their culture is but a trifling more expensive or troublesome than potatoes, surely we may be permitted to urge their culture, both on the score of pleasure and duty. The sooner they are gotten in, the more prolific will their yield be.

Carrots and Parsnips.—The time has arrived for putting these excellent roots in. While both are good for cows and hogs, the latter is most excellent for horses, being conducive to fat, looseness of hide, and silkiness of hair.

White Carrots.—This is a new variety—one of but recent introduction in this country. Its yield to the old variety is as five to three in favor of the former. If you design trying their culture, get them in as speedily as possible.

Field Peas and Beans.—The sooner that these are planted the better.

Millet.—We have before reminded you of the propriety of cultivating this grain, and we will now say, that it may be sown any time this month, or up to the 10th of the next. Its culture is simple, differing nothing from that of oats, except that it requires to be grown in rich ground, and that, if you wish a large product of grain and a luxuriant one of hay, you must manure. It delights in a rich sandy, or rich loamy soil. The ground should be ploughed twice, manured well, and thoroughly pulverized, by rolling and harrowing. Sow three pecks of seed to the acre, harrow it lightly in, and finish by rolling. If your ground is congenial, and thoroughly put in order, you may calculate upon thirty bushels of seed per acre, and fully three tons of hay. It should be cut, if you design it for hay alone, when the seed first begin to turn yellow at top. If for hay and grain, you may delay cutting until one-half the seeds are ripe. If intended for hay and grain, cut it with cradles, and tie it up in small sheaves, and thresh it out as you would wheat, rye or oats. We look upon both Buckwheat and Millet as a most admirable resource for the farmer when his oat-crop may fail.

Sweet Potatoes.—As soon as you can get these in do so; but be sure not to omit planting some.

Fruit Trees.—Give them speedily a washing with a solution of potash, all over the trunk, and as far up as you can reach the large limbs. Make the solution thus: dissolve 2 lbs. of potash in 10 gallons of water, and put it on with a large sized painter's brush; first rubbing the bark with a hard horse or scrubbing brush. In two weeks after having done this, give your trees another painting with the following. Boil 2 lbs. of tobacco, or tobacco stems, in a gallon of water until one half the quantity is evaporated; then take 5 gallons of good thick soft soap, mix with this, 2 lbs. of sulphur, and then stir in the tobacco decoction until the whole is thoroughly mixed together—Give to your trees a coat of this.

Melons of all kinds must now be planted.

Working Cattle.—These faithful creatures must receive increased attention and care, be well fed, regularly cleaned, and bedded at night. If their feed were ground or chopt, less would answer them, and they would thrive better on it.

Implements and Tools.—When not in use, see that these, of every kind, are kept under cover: once a week examine every thing of the kind you have, and have whatever may need it, repaired.

Soiling.—If you wish to place yourself in a position to greatly increase your manure heap, so soon as you have got your spring crops in, haul into your cow yard as much muck, or mould and leaves, as will give you a foot in depth all over it. Spread it, so that the edges will be highest—Then go to work, and sow, on a well manured and prepared half acre of land, two bushels of corn, broadcast, in four weeks from this, sow another half acre. This will give you green provender enough, after the first sown is two feet high, to soil your milch cows the whole summer and the greater part of the fall, and by occasionally sowing plaster over the yard, you will prevent the escape of the most valuable part of their liquid manure—the ammonia—and thus, increase a most valuable body of manure. By yarding your cows at night, besides adding to your supply of manure, you will save much time in hunting them up in the morning, and they will give you richer and better milk, and consequently more butter.

Having furnished these hints, as to the work on the farm, we will see what may be done

IN THE GARDEN.

Early Cabbages.—If you took our advice last fall, and planted out a bed of early cabbage plants, look to them now, cleanse them thoroughly of weeds, give them a thorough working, and hill up the stalks, and be sure to keep the earth well stirred and the weeds down. If there are any of the plants which show a disposition to head, tie up the leaves with a strip of bass matting, or any other soft substance, as it will greatly facilitate their heading. If you have plants ready for being set out, prepare your bed at once and transplant them.

Fall Cabbages.—Prepare your beds forthwith, and sow your fall cabbage seeds of all kinds.

Cauliflower and Borocole Plants.—Plants of these must be set out immediately for early use—and it is also time to sow the seed of each for fall use.

Peas.—Plant a bed of peas, to come in when the earlier supply may become exhausted.

Beans of all kinds should now be planted; and as a stiff soil suits them best, we would advise you to select beds of that kind of soil for their culture.

Lettuce, Radishes, Spinach and small Salading.—Seeds of all these should now be sown.

Carrots, Parsnips and Beets.—The seed of each of these fine garden roots, should be sown early, to ensure their full growth.

Onions.—Keep your onion beds clean, but do not hill up the bulbs.

Early Turnips.—There are but few vegetables which make a more grateful summer dish than the turnip, and with a little care in the preparation of the bed, you may grow a supply either for your own table, or market. If you have not already done so, prepare and sow a bed now.

Celery.—If you are prepared with plants, set them out; if not, forthwith sow a bed of celery, as besides being a delicious vegetable, it is a most healthful one.

Asparagus Beds.—These require being kept clean at this season.

Tomatoes, Egg Plants and Okra.—The seed of each of these may still be sown.

Melons of all kinds, Cucumbers and Squashes.—Seed of all these should now be planted.

Sweet and Irish Potatoes.—Plant these as early as possible.

Thinning Fruit.—If your trees of stone fruit are heavily burthened, thin out the fruit.

Strawberries.—Should the weather prove dry while your strawberries are ripening, be careful to keep the beds well watered.

Dahlias.—Set out your bulbs forthwith, but be sure to manure the ground well. When up, keep them clean and the earth open; and whenever the weather may be dry, water the plants freely.

Flower Seeds of all kinds may be sown, and shrubs planted out, if done early.

Watering.—During drought, use your watering pot freely—and above all, see to every thing yourself, as far as practicable; your gardener and other hands will be thereby induced to do you more justice—a negligent employer, or master, is always cheated.

JUNE.

And after her came jolly June, array'd
  All in green leaves, as he a player were,
Yet in his time he wrought as well as play'd,
  That by his plough-irons mote right well appeare;
Upon a crab he rode, that did him bare,
  With crooked crawling steps an uncouth pace,
And backward rode, as bargemen went to tare,
  Bending their force contrary to their face;
Like that angracious crew which faines demurest
    grace.

June is the sixth month of the year. In the old Latin calender it was the fourth. It consisted originally of twenty six days, to which Romulus is said to have added four. Numa afterwards deprived it of one day; which, however, was again restored by Julius Cæsar, and it has ever since remained unaltered.

An old author says, "unto June the Saxons gave the name of *Weyd monat*, because their beasts did then weyd in the meddowes, that is to say, go to feed there, and here of a medow is also in the Tutonicke called a *weyd*, and of *weyd*, we retain our word *wade*, which we understand of going through watrie places, such meddowes are wont to be."—Another author likewise says, that "*weyd* is probably derived from *weyden*,

WORK FOR JUNE.

JUNE, the first of the summer months, with its clear sky and warm suns, has come, bringing with it its cares, its toils, and its pleasures. When the husbandman looks around him, in his broad fields, covered with the luxuriant growth of vegetation, how instinctively should his thanks be poured out at the foot-stool of that Great Source of goodness, by whom his interests have been cared for, and through whose agency and paternal kindness, he is about to reap the rich reward of his labors, and thus to be enabled to provide for those who look up to him for support and comfort. Considerations and feelings such as these, are as honorable to human nature, as they will prove acceptable to Him to whom they are due, and by whom they will be received as evidences of our deservings.

With these reflections upon the change of the season, let us turn our minds to those objects which more immediately claim our attention

UPON THE FARM.

Wheat.—We would recommend this grain be cut before it becomes *dead ripe*, as by so doing you will not only prevent much loss from shattering, but secure the straw in a condition infinitely more nutritious, than when left too long standing, and consequently deprived, by the effect of drying and evaporation, of those juices which impart to it its greatest value as food for stock. It should be an object too, to have plenty of force, so that the grain may be cut and got in in good time, and thus preserved from injury from the elements. If there is not room for it under cover, the *stacking* should be well done; and to ensure this, it would be best, that that duty be confided to faithful and competent hands, under the immediate superintendence and direction of the proprietor. Many a good crop of wheat has been impaired in its market value by slovenly stacking, or storing, a thing which should never be permitted to occur, as after encountering all the trouble of culture and harvesting, it is sinful to permit it to be wasted by indifference, or neglect.

Corn.—It should be an object of primary moment with every corn grower, to keep his corn-field well worked and perfectly clean from weeds and grass, as without the soil be kept open and free for the admission of air, rain and dew, and the plants be preserved from the intrusion of those pests, its product will be greatly diminished. To succeed well, *corn* must have no neighbors but those of its own kind—the companionship of strangers, being as fatal to its healthful existence and vigorous growth, as the presence of a Paul Pry is offensive to the sensibility of a well-bred gentleman. And as there is no time to be lost now, let us enjoin it upon you as a duty you owe yourself, to push onward, with all your energy, in the cultivation of your corn.

Fall Potatoes.—Those who may not have gotten in their fall crop of potatoes, should bear in mind that they should be promptly planted, as they require *time* to ripen the roots. At all events they should be in the ground by the 10th or 15th of the month, and would be all the better of having been planted by the middle of the last month.

To those who may not intend to provide other roots for their milch-cows, we would respectfully suggest the propriety of putting in a patch of potatoes for that

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(German,) to go about as if to pasture," he further says they call it *Woedmonath*, and that *woed* means "weed;" and that they called it also by the following names:—*Medemonath*, *Midsummermonath*, and *Brackmonath*—thought to be so named from the breaking up of the soil, from *bræcan* (Saxon,) to break; they also named it *Lida erra;* the word *Lida*, or *litha*, signifying in Icelandic, "to move, or pass over," may imply the sun's passing its greatest height; and *Lida erra*, consequently, mean the first month of the sun's descent. *Lida*, it is added, has been deemed to signify *smooth air*. Leigh Hunt observes that "the name of June, and indeed that of May, gave rise to various etymologies; but the most probable one derives it from Juno, in honor of whom a festival was celebrated at the beginning of the month." In some parts of Europe, a custom is still kept up during this month, of throwing flowers into the streams, an evident relic of paganism.

purpose; besides furnishing a most grateful change of food in the dead of winter, they would add greatly to the yield of butter by the cows, either of which considerations are worthy of attention; the first, as it comes commended by sentiments of humanity, and the last, by motives of interest.

Mangel Wurtzel and Sugar Beets.—If not already done, let these be *thinned* out with care, well cleansed, and kept so until laid by.

Ruta Baga.—Presuming that you have already given the ground you have allotted for this *root*, a good and thorough ploughing—deep and well turned—we would advise you as soon as the grass begins to spring up in the ploughed land, to put in your plough, and give it another ploughing—this done, harrow, and let the land lie until about the 20th of the month, then cart on your manure, and plough it in not deeper than three inches; harrow again thoroughly, so as to make a fine tilth, and roll well. Then, if you have a drill barrow, drill in your seed, in rows about two feet apart, finishing by sowing ashes on the rows after the seed is covered; ten bushels judiciously strewn will be enough for one acre.

After Culture.—As soon as the Ruta-baga plants come up, in order to protect them from the fly, you should let a careful hand go along through the rows, mop in hand, and sprinkle them with fish oil. If carefully done, a gallon will be enough for an acre, and as the man with the oil scatters it on the leaves of the young plants, another should follow in his track and strew soot, or ashes on them. By this attention, which will require scarcely any outlay of money, and not more than half a day's labor, you will save the young plant from its foe. When the plants are safe from the ravages of the fly, and about two or three inches high, they must be thinned out so as to stand about eight inches asunder in the rows. The persons entrusted with the thinning process, must at the same time clean out all grass or weeds with his hoe. In about eight or ten days after this, either put a cultivator in, and cleanse the rows of all weeds, or have it done by hoe-men, taking care not to make any hill around the bulbs, which will then be forming. By using the cultivator in the middle of the rows, much time will be saved, as the hoe will only then be required between the plants, which can be done, without much cost in labor or money. Two similar workings, at intervals of eight or ten days will suffice for the crop, if well and faithfully executed.

Of Seed.—A pound of seed, if skilfully drilled, will be sufficient for an acre, though a slovenly hand might require two pounds.

Of Manure.—Cow manure is the best, and that would be preferable, if it had been carried through the process of fermentation, and mixed with about a hundred bushels of ashes, to twenty double horse cart-loads of the former; though we have seen a very large crop of ruta-bagas grown, when the manure used was from the barn-yard, of which horse-dung formed a large portion of it, and applied too in its long state. We have seen good effects result from the sowing of six bushels of refuse fish salt upon an acre of ruta-bagas just after they were drilled. While the stench of the fish appeared to us to keep off the fly, the salt and the oleaginous particles it had imbibed from the fish, evidently imparted to the young plants nourisment, which encouraged their rapid growth.

Clover Hay.—If an auspicious and forward season has not enabled you to cut your clover, do so as soon as it is in full blossom: cure it in cocks, and stack it away as soon as it is dry. Indeed, if you sprinkle a peck of salt on each ton, as stacked, you may put it up before that period, as the salt will prevent its heating, besides rendering the hay much more acceptable to your stock. If you wish your clover to do you the utmost service in the melioration of your soil, you should neither cut the after-math, nor suffer the cattle to depasture on it. By suffering the second growth to perish upon the ground, you will provide for the roots next winter, not only a warm protective covering, but to the soil itself, a pretty fair top-dressing, whose benefits you will witness in the vigorous growth of the young clover the succeeding spring. If, however, you design turning in your clover this fall, and to sow wheat thereon, or to plant it in corn next spring, you may suffer your stock to graze on it. But if you design *corn* to succeed the clover, by all means you should sow salt on it soon after cutting the clover—about five bushels to the acre—by so doing you'll destroy the cut and grub worm, and thus preserve your young corn plants next spring.

Soiling Stock.—There are but few farmers whose stock do not suffer for the want of pasturage in the latter part of August, and during the month of September. The falling off of the cows in *milk*, and consequently in the production of *butter*, during that period, is sorely felt by all, and too often have we to witness a distressing depreciation in the appearance of the cattle also. Now as the inconvenience and loss to ourselves, and discomfort to our stock, can be obviated, at a trifling expense, and comparatively little trouble, we do think that it should be done. Two acres of good ground, well manured and prepared, if sown in *Corn* broadcast, or *Millet*, would furnish green food twice a day for twenty head of cattle for six weeks, and the trouble of cutting and feeding it to the stock, would not take more than an hour's time each day, of a smart hand, which labor would be more than paid for by the manure which would be made, as cattle soiled should always be kept in the yard through the night. In sowing either of these grains, the piece of ground allotted to it, should be sown in portions, at intervals of some days apart, so that the whole might be cut over before it should get too old. If *Corn* be sown, four bushels to the acre is the proper quantity of seed. If *Millet*, half a bushel to three pecks. By adopting this plan of soiling in the latter part of summer and fall, besides the large additional quantity of manure which would be made, the farmer, or planter, would have the satisfaction of seeing his stock enter the winter in good condition, vigorous, healthy, and consequently infinitely better able to meet its rigors and privations. Independently, however, of the virtues of Millet for soiling, it is a most excellent crop to grow for hay, when timothy or clover meadows may not abound, or scarcity, arising from unavoidable circumstances, may be threatened; therefore, we will say a few more words upon the subject of the culture of

Millet.—We called attention to the culture of this plant in our "*Work for May;*" but as the time has now arrived when, if at all this season, it should be sown, we think it not amiss to bring it again to the notice of our readers. We do so from the high sense we entertain of its merits, as a resource for hay, where a scarcity of the grasses usually grown for that article may be apprehended. All animals relish it well; in point of nutrition, when cut at the proper period, just before, or immediately after the upper parts of the heads are tinged with yellow, it is superior to either timothy or clover; it is easily cured; on good land, adapted to its growth, it will yield more per acre than either; it withstands the heat and drought of summers better than any other; working cattle labor well, and keep in good heart and condition on it. This is saying a great deal in its favor, the reader will probably conclude; but not more than we feel justified by our *experience* in saying. To ensure a good crop—the ground must be suitable, well manured, and thoroughly pulverized.

Harvest Tools.—Have your harvest tools of every description hunted up, adjusted and repaired, or supplied by new ones; don't leave doing this off till the last moment.

Harvest Supplies.—Get all your supplies of provisions and groceries for the harvest, and don't have to send off a hand to town for them at a moment when he should be in the field.

Pumpkins, Melons, &c.—Be careful to have your patches of these kept clean of every thing in shape of grass or weeds, and to keep the earth open to the influence of the weather.

Orchard.—All young trees which may have been newly planted should be examined, and have the irregular shoots displaced, so as to give shape and form to the heads. Newly planted trees should, during this and the succeeding summer months, be aided in the time of drought by being watered. All fruit trees should be also examined and cleaned of all catterpillars, together with their nests. The best way we have ever seen practiced, is to make a mop of rags around the end of a pole, moisten this with spirits of turpentine and dislodge the catterpillars, nests and all, taking care to burn them. Such of your apricot, nectarine, and peach trees, as may be over burthered with fruit, should have it thinned out, so as to leave only as much as you think can be supported by the tree without injury. The trunks of all of the more delicate kinds of fruit trees—those that are liable to be injured by worms and insects,—should receive a coating, or painting, of *soft soap, salt and flour of sulphur*, and have a mixture of salt, salt-petre and ashes strewn around the tree, so as to form a circle of some two or three feet. The *Peach* tree, in addition to this, should have its trunk examined for three or four inches under the ground for the worm, which should be picked out with the point of a knife, or piece of wire, and killed; then paint the part of the trunk thus exposed with the mixture of soap, salt and sulphur, and sprinkle a mixture of eight parts salt and two of salt-petre over the earth thus exposed, and then cover up. Plum trees, apricot trees, &c., may be saved from the insect that destroys their fruit, by having a solution of tobacco and sulphur thrown freely over the branches once a week.

Buckwheat.—This grain, either for the purpose of grain, or that of ploughing in, may now be sown. If for its seed, a peck, or a peck and a half of seed to the acre will be enough; if for ploughing in, from half a bushel to three pecks will be necessary. If any one has a poor piece of ground that he wishes to put in Rye next September, let us persuade him to sow it in Buckwheat, and as soon as that is in blossom, plough it in; then sow the rye, and the gage of a man of truth for it, it will add twenty-five or thirty per cent. to the yield; and we will promise you fifty, if, before ploughing in the buckwheat, you sow on it ten bushels of lime to the acre.

Weeds.—Extirpate them whenever you find them on your farm; suffer none to go to seed, and as you cut them down, put them on your dung heap, and make them, in the rottenness of their bodies, repay you for their occupancy of your land and the trouble of their collection. As we have pretty freely discussed the business of the *farm*, let us direct our footsteps towards, and see if we cannot find something worthy of attention

IN THE GARDEN.

Potatoes.—Weed and hill up your *early* potatoes; prepare your ground and plant your *late* ones, if you have not already done so. Procure good seed, the *Mercers* if you desire farinaceous mealy bulbs; be sure to prepare the ground well and give plenty of manure, and to strew some lime on the top of it. Should the worm attack the tops when they come up, strew salt over them.

Water Melons, Canteloupes, Musk-Melons, Squashes and Cucumbers, must all be thinned out, if not previously done, and hoed up: keep them clean of weeds and the earth open until you have done with their culture. Don't forget when they begin to run, to top them, so as to induce them to form their fruit.

Sweet Potatoes.—These must have the earth drawn around them, and care be taken to preserve sufficient flatness at the top of the hill, to allow of the penetration of the water; and be sure to keep them clean at all times.

Cauliflowers.—Your early cauliflowers will now be forming their flowers, which you must protect from the sun and rain, by breaking the leaves and bending them over them, so as to form a barrier against both. Such plants as may not be thus forward, must be kept clean and watered in dry weather.

Cabbages.—Plant out your cabbage plants the first wet season, and see that they do not afterwards suffer by drought or weeds; the first you can prevent by watering, the latter by the hoe. If you desire *headed* cabbages in *early autumn*, you may procure them, by sowing any of the earlier varieties of seeds in a rich bed and setting them out as soon as they may be large enough.

Broccoli plants may now be planted out; but if you wish them to succeed, you must give them a rich bed, which should be previously well manured and dug deeply.

Celery.—Your early celery plants must be set out in trenches; but before you do so, be sure to trim off the tops. After being planted, they must be regularly watered every evening until they take root, or a good drenching rain shall relieve you of this labor.

Peas.—You may plant a small bed of Peas for late use.

Asparagus beds, which may be now running up to seed, must be weeded and kept clean.

Leeks may now be transplanted in a good rich bed, thoroughly manured and prepared.

Lettuce.—Transplant lettuce plants, and sow seed for a successive supply.

Small Salading of all kinds should now be sown, and you may continue to do so, at intervals of a week, for several successive weeks: by doing so, you will secure a continuous supply.

Kidney Beans, for late supply, may now be planted. Should the ground be dry, don't omit to water them.

Lima Beans.—Hoe and keep them clean, and if you have not already stuck them, do so forthwith.

Radishes.—Sow Radish seed now, and at intervals of a week throughout the month; by so doing you'll be able to keep up a supply of crisp ones for table or market.

Beets, Parsnips and Carrots.—Thin out these and be sure to keep them as clean as a new penny.

Turnips.—If you desire to have early turnips, either for market or to grace your table, prepare a deep loamy bed, by manuring it well with cow dung, which should be dug in deeply; rake the ground fine as you dig the ground; when your bed is made as fine as the rake can make it, sow your turnip seed, then strew ashes over the bed, and rake the seed in. This done you must press down the earth with the back of a spade or shovel, and thus complete your work. When the plants *first* come up, sprinkle fish oil over them with a *mop*, and dust them with soot, or ashes.

Endive.—Transplant your Endive plants, and sow more seed for a late supply.

Okra, Egg and Tomato Plants must all be hoed up and weeded.

Horse Radish.—Hoe and weed between the rows and plants.

Red Peppers.—Your pepper plants must be set out, and watered in dry weather until they take firm root.

Strawberries.—You may now make new plantations of strawberries, and provided you keep the plants well watered they will take root, thrive well, and bear better next spring than those planted later. If you have no strawberry bed in your garden, let us have sufficient influence with you, to induce you to plant out one *now*, or at farthest in August next. Besides being the most delicious of all the garden fruits, they are among the most healthful; and, therefore, no husband and father, should fail to provide for his family a luxury which has so many good qualities to recommend it to favor.

Grapes.—Carefully tie up the young shoots of your vines as they advance, and when the bloom is over give the vines a good hoeing, so as to destroy the weeds.

Hyacinths and Tulips.—Towards the latter part of this month, you should take up the bulbs of these. When taken up, cut the stems off close, and place the roots in a cool shady room, where they will be dried gradually. When perfectly dry, put them away in boxes, or bags, and hang them up in a dry room until planting time.

Pinks and Carnations may be propagated by lays, as soon as the plants are in full bloom, or it may delayed until the flowers are on the decline.

Pinks and Carnation Seedlings may now be set out, and kept well watered until they take strong root.

Annual flowers, of almost every kind, may now be set out.

Box Edgings must now be trimmed.

Flower Borders and Shrubberies should be kept clean and neat, or the beauty of their effect will be destroyed.

Watering.—See that nothing requiring it fails to receive supplies of water.

Dahlias.—Keep down the weeds around your *Dahlias*, so as to have the earth at all times clean and open. Once a week water them with *soap suds*, and you need not fear but that you will be gratified with a luxuriant growth, and rich and brilliant bloom. Besides the soap suds, they must always, *in dry weather*, be kept moist by watering; for being a plant of great succulence, and hungry withal, they require to be generously treated.

Onions.—See that your onion bed is kept clean this month.

Though we have endeavored to avoid it, we have doubtless omitted to point out many things requiring attention, and have, therefore, to request you to cast a daily eye through every department of your garden, and give such directions as the necessities of each may require at your hands. If you have not been used to such superintendence, begin it now, you never can commence the good work younger; and you may take our word for it, that when once fairly enlisted in it, you will find it among the sweetest sources of pleasure enjoyed by you.

THE SEASONS.

I love the laughing, blooming SPRING;
 The lively month of May;
When woods, and fields, and mountains ring,
 'Tis nature's gala day.

I love the withering AUTUMN, too,
 With its sere and yellow leaf;
When all around us wears the hue
 Of nipping, chilling death.

I love, too, stern old WINTER's time,
 With his cheerful blazing hearth—
With the laughing song and merry rhyme;
 'Tis the time for social mirth.

But the lovely, calm, long SUMMER's day,
 With the buzz of the humming bee,
As from flower to flower she wends her way,
 The SUMMER, the SUMMER for me!

JULY.

Then came hot July, boiling like to fire,
  That all his garments he had cast away,
Upon a lyon, raging yet with ire
  He boldly rode and made him to obey.
[It was the beast that whilom did forray
The Nemæan forrest, till the Amphitrionide
  Him slew and with his hide did him array!]
Behind his backe a sithe, and by his side,
Under his belt, he wore a sickle circling wide.

July is the seventh month of the year. According to ancient reckoning it was the fifth, and called Quintilis, until Mark Antony denominated it July, in compliment to Caius Cæsar, the Roman Dictator, whose surname was Julius, who improved the calender, and was born in this month.

July was called by the Saxons *heumonath*, which probably expressed the meaning of the German word *hain*, signifying wood or trees; and hence *heumonath* might mean foliage month. They likewise called it *heymonath*, or *hay month*; "because," says Werstegan, "therein they usually mowed and made their hay harvest;" and they also denominated it *Lida aftera*, meaning the second "Lida," or second month after the sun's descent.

WORK FOR JULY.

HARVEST HYMN.

God of the rolling year! to thee
  Our songs shall rise—whose bounty pours
In many a goodly gift, with free
  And liberal hand, our autumn stores!
No firstling of our flocks we slay—
  No soaring clouds of incense rise;
But on thy hallowed shrine we lay
  Our grateful hearts in sacrifice.

Borne on thy breath, the lap of Spring
  Was heaped with many a blooming flower;
And smiling Summer joyed to bring,
  The sunshine and the gentle shower;
And Autumn's rich luxuriance now,
  The ripening seed, the bursting shell,
And golden sheaf, and laden bough,
  The fulness of thy bounty tell.

No menial throng, in princely dome,
  Here wait a titled lord's behest,
But many a fair and peaceful home
  Hath won thy peaceful dove a guest;
No groves of palm our fields adorn;
  No myrtle shades or orange bowers;
But rustling meads of golden corn,
  And fields of waving grain are ours.

Safe in thy care the landscape o'er
  Our flocks and herds securely stray;
No tyrant master claims our store;
  No ruthless robber rends away;
No fierce volcano's withering shower;
  No fell simoom with poisonous breath;
Nor burning suns, with baleful power,
  Awake the fiery plagues of death.

And here shall rise our songs to thee,
  Where lengthened vales and pastures lie,
And streams go singing wild and free,
  Beneath a blue and smiling sky;
Where ne'er was reared a mortal throne,
  Where crowned oppressor never trod,
Here, at the throne of Heaven alone,
  Shall man, in reverence, bow to God.

In entering upon the labors of this month, when most of us are about to be called upon to perform the duties of the harvest field, the mind should, and doubtless will, turn in gratitude to the Author of our being for the many blessings he has dispensed to us. For, notwithstanding all the afflictive embarrassments and burthens, national, state, and individual, which have to be encountered, still, as a *people*, we have been favored beyond the measure of almost any other. Luxuriant crops and fruitful harvests, present and prospective, greet us, with but few exceptions, in every quarter; every branch of agricultural industry has, or promises to be crowned with success as bountiful as it is cheering. And whatever may be our apprehensions with regard to prices, profits, and the accumulation of wealth, we should nevertheless pour out the aspirations of hearts sensibly alive to, and impressed with, the munificence of those gifts of health and plenty which, through the mercy of Providence, have been bestowed upon us. If, owing to the peculiar position of the affairs of the world, the rewards of our toils are not to be as remunerating as they were in years gone by, even from this very curtailment of revenue, we may be enabled, if it be properly appreciated, to derive lessons of lasting benefit, as while it should teach us to look forward, as among the certainties of life, to the mutability of every thing which belongs to earth, and to place our hopes beyond its confines, it should *teach* us also the necessity of regulating all our expenditures by a well balanced and judiciously arranged system of economy—an economy having for its objects, the improvement of the soil, the *reduction* of labor and the *increase* of production—an economy which shall enable us with a greatly diminished force, to procure an equal amount of product from off half the quantity of land. That this thing is attainable we entertain no doubt, and so thinking, shall leave the subject to the sober consideration and serious reflection of our agricultural brethren; and having done so, we will claim their attention for a short time, while we consult with them upon a portion of the many things that should be attended to during the present month

ON THE FARM.

Harvesting.—As this will be the first business requiring attention, we would remark, that the *grain* should, wherever practicable, in every instance, be cut before it becomes dead-ripe, and for three reasons: first, because much is lost by shattering; secondly, because the straw is, when cut under such circumstances, much more nutritious and better relished by the stock; and thirdly, because the soil is thereby relieved from a source of great exhaustion.

While upon this subject we would ask leave to be indulged in a little advice, and that, though gratuitously given, it may be received in the same kindly spirit which prompts it.—In harvesting, be sure to have plenty of force, as much is thereby gained by not only getting your grain quickly down, but housed and stacked away, in good season and condition. By going to work full handed, prompt advantage may always be taken of the alternations of the weather, and benefits of vital importance to our success be thus secured. Than in the operations of the harvest field, there is no portion of a farmer's business where *extra expense* is more excusable. Having supplied yourself with ample force, there is one other suggestion we should like to make to you,—it is this—*see that that force faithfully discharge their duty to you.* To ensure this, it will be necessary that you give personal and constant attendance upon all the labors of the field, from the morning's dawn till the termination of each day's work. Your manager, if you have one, may be, and we sincerely hope he is, a very attentive, clever and industrious man, but notwithstanding that, there will be employment enough for both of you, in the way of superintendance; and let us tell you, that in a field of twenty cradlers, your *presence* will be equal to the labor of five hands.

As strong spirituous drinks have been done away with by many, to such as may have carried the glorious principles of temperance into the harvest field, we would advise the adoption of the following *Harvest Drink* — Mix with five gallons of good cool water, half a gallon of molasses, one quart of vinegar, and two ounces of powdered ginger. This will make not only a very pleasant beverage, but one highly invigorating and healthful. The molasses, vinegar and ginger will prevent any evil consequence resulting from the water, however cool that may be, and however heated may be the system at the time of taking a drink. In a word, this beverage will exhilerate the spirits without exciting them, nerve the arm for vigorous toil, and refresh the body and nervous system, without entailing upon either that painfully enervating forfeit which the votaries of Bacchus ever pay as the price of indulgence.

Corn.—This, as much as any other crop, delights in cleanliness, and exuberates most under the genial influence of a warm sun and a moist and well stirred earth. Let it be our object then, to keep the soil in such a condition as that it will, at all times, be able to derive the greatest degree of benefit from the rain as it may descend from heaven, and be in a condition to drink in the rich sources of food to be found in the atmosphere and night distilling dews. In preference to wasting your time and strength, in making mound-like hills around your corn, let it be your object to keep the earth open; in preference to delving the earth with the plough, and thereby cutting up and injuring the roots of the corn, let it be your pride to keep its mouths open by the free use of the *cultivator*, from this period until you lay by your crop. And we wish you to bear this in mind, that you can do no possible injury to your corn by working it in dry weather, provided you use the implement just named, but on the contrary essential service.

Fall Potatoes.—We have seen a tolerably fair product of potatoes raised which was planted in the first week of July; but it was chiefly owing to concurring circumstances of season peculiarly favorable to root vegetation that they succeeded; we would not, therefore, advise such late planting, except under particular circumstances of necessity. If, however, there be any who may not yet have planted, they may do so between this and the 10th of the month, and make a tolerably certain calculation of a fair return. To those who may have their fall crops of potatoes in, and growing, we would observe, that large yields can only reasonably be calculated upon as the fruits of careful and well directed tillage. Potatoes, like too many of the biped race, are wrapt up in utter selfishness; and cannot bear a rival near the throne. If weeds, in their impudent assurance, attempt to divide with them the affections and fatness of the earth, diminution in the size of the bulbs is the necessary consequence of such rivalry. To make large, well grown potatoes it is absolutely necessary that they be kept clean while under cultivation, so that neither weeds or grass be permitted to find a resting place in the immediate neighborhood of the former. In recommending a cleanly culture, we do not wish to be understood as advocating large or high hills, but merely desiring to impress upon the culturist the necessity of keeping down all weeds and grass and the earth open. In a country so subject to drought as is ours, we doubt whether hill culture can be relied upon for succcess. In conclusion, we will append the following, from the Maine Cultivator, and ask for it a careful reading.

> "We believe that in most sections of New England, the practice of hilling up potatoes, at hoeing, is rapidly exploding. From the few experiments which we have made in order to test its utility, when compared with the newer notion of leaving the ground level or with but a slight elevation around the stalks, have tended in a great degree to establish the belief that a flat surface or one that is mostly so, is generally the best for the crop. In seasons of drought, a high elevation of the soil in the vicinity of the roots of any plant, is obviously an injury to its growth; whereas a level surface, by permitting the water which descends during showers or casual dews, to sink down the bibulous rootlets, thus strengthening and revivifying the exhausted plants, has precisely an opposite effect.
>
> "It has long been a question with farmers, whether corn should be *hilled*, and so far as we can ascertain, the general conclusion seems to be, that it should not. The many experiments that have been recently made by judicious and practical men, with the express view of elucidating the subject, prove almost conclusively, that hilling is in every respect an injury to the crop.
>
> "And so far as we are qualified to judge, potatoes are equally injured by the same practice; perhaps in every situation to the same extent. If those farmers who have been induced to try the two opposite systems in their effects upon crops in contiguous fields, or upon the same geological formation, would consummate the result of their efforts, the public would be greatly benefitted thereby. 'All true knowledge springs from experience,' says Lord Bolingbroke, therefore, brethren, favor us with your experience and views upon this point."

☞ As you have read the remarks of the editor of the Cultivator, and, doubtless, concluded to make an experiment, repeating the wise saw of Lord Bolingbroke, that, as "*all true knowledge springs from experience*," may we ask you to favor us, in due season, with the lights of yours, for the benefit of your brother farmers.

Hay Making.—As soon as your grass is fully in blossom, and before the ripening of the seed, you should cut it: and in curing your hay it should be your object to dry it without exposure to the rain, and as little as possible to that of the sun. A half day in swarths, with good wind and sun, will be enough, when it should be cocked. Hay cured in this way is greener, more fragrant, and we need not add, is eaten with much greater avidity. In stacking your hay do not omit to sprinkle a peck of salt over every ton of it.

Millet.—Those who may apprehend a shortness of provender to carry them through the coming winter and spring, may avail themselves of sowing millet up to the 10th of this month, provided they manure well to ensure prompt and continued growth to the plants. It bears the drought well, but cannot *bear* a stinted diet.

Buckwheat.—In this grain, the farmer has a resource to eke out his fodder and hay. If cut when in blossom, properly dried and stacked away with a peck of salt to the ton, it will make a hay which will be well relished in winter by his cows and working oxen. Though not as good as clover, herds grass, timothy or millet hay, it is better than that cut from salt marshes, is an excellent promoter of milk, and if cut and mixed with bran or meal of any kind, will prove a highly nourishing food. For *grain* it may be sown any time up to the 10th of the month. If sown with this object, as soon as cured, the grain should be thrashed out and the straw packed away as above directed for cattle provender. For *hay*, or for *ploughing in*, it may be sown as late as the 20th of the month. Whether sown for the one purpose or the other, it would be well to sow a bushel of plaster to the acre.—While the plaster would promote the growth of the plant, it would tend to meliorate the condition of the soil.

Turnips.—As this has become a very difficult crop to preserve from the ravages of the fly, we would advise that earlier sowing than usual be resorted to.—Instead of waiting, as is too often the case, until the middle of August, we would advise their being sown by the 25th of the present month. Should the first sowing fail, then there will be time enough to sow again. We recollect to have had two crops successively destroyed by the fly in the year 1839, and to have succeeded with the *third*, on the same ground. Now, had we delayed planting until the usual late period, we should have failed entirely. Prudence taught us in that instance to be prepared against the worst, and we would here enforce upon our readers the propriety of acting from similar motives.

Preparation of the Ground.—Let the ground intended for turnips *be ploughed at once*, and to the depth of ten inches, if your team and plough will enable you to do so. After ploughing up your ground, harrow it and let it remain until you wish to plough it again for sowing your turnips. When that time arrives, haul on 20 double horse cart loads of cow manure to the acre, and after spreading it evenly, plough it in sufficiently deep to cover the manure well, say three or four inches in depth, then harrow, and furrow crosswise, so as to make a fine tilth. Then, if you have them, spread on a hundred bushels of ashes to the acre, harrow them in ; then sow your turnips, at the rate of 1 pound of seed to the acre, taking care to distribute the seed as evenly as possible.

After Culture.—Watch the coming up of the plants, and as soon as they show their heads above the ground, sprinkle them with fish oil. This you can readily do with a mop. That done, sow over them at the rate of a bushel to the acre, slaked lime or ashes. The efficacy of either of these, in their preventive effects, will be promoted by an admixture of 4 lbs. of the flower of sulphur, or by having a decoction of *assafœtida* mixed with it. To make the decoction, a half a pound, or a pound of assafœtida should be bruised in a mortar until tolerably fine, and then boiled in a gallon of water, till reduced to half the quantity. This decoction must be incorporated with the ashes or lime, and sown over the turnips.

When the leaves of the plants get to be the size of a dollar, run your harrow freely through the patch, and don't be afraid of dragging them up. Repeat this operation crosswise in a week from the first harrowing.

As soon as the roots begin to bottle, your hoers must go into your patch, thin out the plants, so as to stand 8 inches apart, taking care to clean out every thing in the shape of weeds or grass. In a week from this, give them a second weeding with the hoe, and you may then lay them by.

Orchard.—As prevention is better than cure, the hogs should be turned into the orchard to eat up all the decayed fruit as it may fall, and in doing so destroy myriads of curculio in their embryo state. If you can't turn your hogs in, have all the fallen fruit carefully picked up and thrown into the hog pen.

The roots of the Peach trees should now be examined and the worms found thereon destroyed. Before replacing the earth, paint the roots exposed, with a mixture of salt, sulphur and fish oil, as also the body of the tree as far up as you can reach. After replacing the earth sow on the surface, in a circumference of four or five feet around the tree, a mixture of three-fourths salt and one of saltpetre.

Should any of the fruit trees in the orchard, or elsewhere, show canker, or much gum, either should be cut out to the sound wood, after which the wounds should be dressed with a mixture of two parts clay, 1 of pulverized charcoal, and 1 part saltpetre, the whole to be thoroughly mixed together and reduced to the consistence of putty by having oil added thereto.

Weeds.—Don't forget to have every weed extirpated before they go to seed. Have them put in your hog pen, to be eaten or converted into manure by your hogs—or add them to your compost heap or dung pile. Recollect that for every weed you destroy before seeding, you cut off, in the unformed seed, the germs of many thousands which would otherwise remain to fill your lands by their presence, and depreciate the value of your crops.

Well, now, as we have roamed pretty freely over the *farm* and communed together without reserve, suppose we change the scene of action and see what is to be done

IN THE GARDEN.

Cabbages.—The plants you placed out for winter cabbage must be hilled up as needed, kept clean from weeds, and the earth constantly open to the action of rains and dew. Set out your *Savoy* and other cabbage plants the first season. The beds on which your early cabbage grew, should be cleared off, so as to be in readiness for any other vegetable you may require them for.

Melons, Canteloupes, Musk-Melons, Squashes, &c.—All of this tribe of vegetables must be kept particularly clean at this period; should the weather prove dry, they should be watered, at the root, but not over the vines, of an evening about sun down.

Fall Pickles.—Get your beds ready without delay for all descriptions of fall pickles and mangoes, and recollect that each and all of the things grown for this purpose require plenty of manure, and the ground to be dug well and finely raked.

Late Peas.—If you desire a supply of Green Peas, in the latter part of summer and through the fall, you can secure it by planting a few now, of the Marrowfat in some shady part of your garden. Manure the ground, put it in good tilth, plant your peas, keep them clean until sticked, and then they'll do the rest.

Late Beans.—By planting Beans any time before the middle of the month, you may secure a supply either for pickle or for your table, just as you may please.

Cauliflowers.—Plants of this luscious vegetable intended for late fall and winter use, should now be set out. But the utmost care must be taken to water them when the weather may be dry, every afternoon just about sundown, until the roots be well set and the plants begin to grow well.

Small Salading of all kinds may be sown this month on any borders protected from the direct rays of the sun; and in order to secure a successive supply, the seed should be sown at intervals of a week apart.

Celery.—As soon this month as you can get a good season, is the proper time for planting out your celery plants for autumn and early winter use. After choosing for your bed a plot of deep rich loam, in an open exposure, manure it with at least three inches in depth of good rotted manure; then dig that well in at least to the depth of your spade. Then lay out the ground into four feet wide beds with alleys between of three feet; dig the beds a spade deep, throwing the earth upon the alleys: when this is done, then lay four or five inches of strong well rotted manure all over the bottom of the beds; dig and incorporate it with the loose earth remaining, and cover the whole with two inches of earth from the alleys; plant your plants in rows about a foot apart, the plants eight inches asunder. Before inserting the plants trim off the tops. After this, lay cedar bushes betwen the rows to preserve moisture until they take firm start. As the celery is rather difficult to strike at first, it is necessary to water the plants daily when first set out, and until they give out such evidences of having taken a firm root, as cannot be mistaken. The plants must be kept clean until fit for being earthed up, which will be in a few weeks from the time of their being transplanted; when that time arrives, we will tell you how to do it.

Radishes—Don't forget to sow full crops of this esculent now, and at intervals of every few days for some weeks to come.

Early supply of Turnips.—If you did not sow a small patch of turnips last month, do so now, as we directed then, and you will be able to have them on your table in six or seven weeks, and long before many of your neighbors.

Lettuce.—Sow lettuce seed at intervals of a few days, during all this month, to secure a constant supply. If only wanted for your own table, a very small border will answer.

Potatoes.—Keep your potates clean, the earth open—and if you were generous in your supply of manure you need not fear a crop. And should it be so, that you have not yet planted them, you may still do so up to the 10th of the month, and should the season be favorable, you will be rewarded with well sized roots. But mind, to secure this, plenty of manure, and thorough cultivation are requisites which must not be omitted.

Fruit Trees—Such of your trees as may have been grafted or budded the last season, must be carefully looked over, and have all the shoots from the stocks rubbed off, for if permitted to remain they will rob the grafts of their nourishment.

Cherry, Plum, and Apricot Trees, should now be budded. *Pears* may be inoculated late in this month.

All these operations succeed best when performed in cloudy weather, and will be the better of being done in the evening.

AUGUST.

The eighth was August, being rich arrayed
  In garment of gold, downe to the ground:
Yet rode he not, but led a lovely mayd
  Forth by the lily hand, the which was crown'd
With eares of corne, and full her hand was found.
  That was the righteous virgin, which of old
Lived here on earth, and plenty made abound!
  But after wrong was loved, and justice solde,
  She left the unrighteous world, and was to
    heaven extoll'd.

This is the eighth month of the year. The ancient Roman year commenced with March, and the sixth month was called Sextillis. The name was changed to August, in compliment to Augustus Cæsar. In the calender of Julius Cæsar, the distribution of the days through the several months was more commodious than the present arrangement. The first, third, fifth, seventh, ninth and eleventh months, In entering upon the duties of this, the last summer month, it may not be amiss to call your attention to those labors which are peculiar to it; not that we are vain enough to suppose that we can throw out a single new idea, but that by giving you a timely, well intentioned hint, we may be of service in directing attention to some few things which might otherwise escape your notice. Now for the work

ON THE FARM.

Harvesting.—With the exception of late *oats* and *timothy*, you have, we are aware, not only cut but secured all your grain and grass. So, therefore, it may only be necessary for us to jog your memory as to these, and with that view we would remind you, that *both* should be cut before they become dead ripe. As to *Oats*, much is saved by cutting them early, in the prevention from shattering, a source of great loss to farmers, and against which all prudent men should guard.

With respect to *timothy*,—this grass should be cut when the seeds of the head are perfectly formed, and before the stalks become arid. Thus cut, the hay is more fragrant, more acceptable to the beasts, as well as more sightly to the eye, and therefore more saleable. It may, possibly, be proper for us to make a few remarks with respect to the manner of curing. In drying, it should be the aim of the farmer to preserve its greenness as much as possible, and this can only be done, by excluding the grass when cut as much as practicable from the influence of sun and rain. After remaining a half a day in the swarth, the hay should be thrown into small cocks, of the size of a bushel. In this condition it should remain until the succeeeding morning, when, after the moisture of the previous night's dew has become evaporated, these cocks should be increased by throwing three into one, or four into one if the weather be clear, windy and dry. On the following day, about midday, you may begin to haul in and pack away. In packing it away, be sure to strew a peck of coarse salt to each ton of it. If you do so, though your hay may be not quite cured, it will go through the sweat without injury, and render it much more acceptable to your stock than it would otherwise be, and relieve you from the necessity of salting your stock through the winter.

Thrashing.—The sooner you get your wheat thrashed and cleaned, the better chance will you stand of being able to avail yourself of the rising of the market. Indeed, we do think that the chances for a good remunerating price is generally in favor of him who may get his wheat earliest to market.

Fallowing.—As soon as your harvest shall have been secured, it will be time for you to begin to plough your fields for fall sowing. Your *Rye*, it should be your object to get in in September, and, therefore, if you do not intend to sow in corn-fields, you have but little time to delay. In ploughing, our advice is, that you go as deep as the strength of your teams will allow, whether the ground to be ploughed be a clover-ley, grass-ley or old field, as we think there is no truth more demonstrable than this, that *deep pasturage* always tends to promote healthful vegetation. Should the ground destined for your fall grain be an old field, unburthened with a grass carpeting, we would, by all means, recommend that it receive *two ploughings*, the first to be very deep, so as to completely bury all

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consisted of thirty-one days each, and the other months thirty, excepting February, which in common years contained twenty-nine days, but in leap years thirty. In order to gratify the frivolous vanity of Augustus, who thought it a disparagement that the month bearing his name should contain fewer days than July, which was named after the first Cæsar, a day was taken from February and given to August. Such was the origin of the capacious distribution of the days among the different months, which now prevails over the whole Christian world, and which, being founded on no principle, requires some pains to be remembered.

The Saxons called the month "*Arn-monat*, (more rightly *barn month*,) intending thereby the then filling of their barnes with corne." *Arn* is the Saxon word for harvest. According to some, they also called it *Woedmonath*, as they likewise called June.

The allegorical picture, at the head of our article, represents Virgo, the Virgin, the sign of the zodiac entered by the Sun this month. The poet Spencer, whose lines we have quoted above, has converted her into Astrea, the Goddess of Justice, who seems to return to earth awhile, when the exuberance of the season presents enough for all.

weed-seeds, and the second shallower; each ploughing to be followed by harrowing. Ground appropriated to either Wheat, or Rye, cannot be too minutely pulverized—it serves to fructify the earth by extracting food from the atmosphere, and to enable the plants to take good root before frost—the latter is a thing of moment, as it entrenches the plants against freezing out.

Timothy Meadows.—This is the time when you should be pushing ahead with steamboat speed, to get your grounds ready for sowing timothy seed, and let us whisper in your ear that, in preparing a field for timothy, you cannot make the tilth too fine, as nothing requires it more, or will better pay for labor thus bestowed. Besides good ploughing and thorough harrowing and rolling,—unless your land is strong and rich, recollect that *manure* is essential to ensure a good crop of timothy—and bear also in mind, that you are putting down a crop that may last for seven years.

The usual method of putting in timothy, is, to *brush* it in—we like not the practice—it is much better to use a light harrow—the seed is much more regularly set and certainly covered. But use what you may, use a roller to finish with.

In *seeding* don't spare your seed. A *peck* to the acre is the usual quantity—though we should prefer a *peck and a half:* with the latter quantity, you will be sure to fill your ground with *timothy plants* instead of leaving room for weeds, and cleanly meadows will be the consequence. When a man can, at a trifling extra expense, ensure such a result, interest as well as duty points out his course too forcibly to need any enforcement from us. The cleaner hay is from weeds, the more valuable is it, and the better price will it bring.

If the field is infested with briars, root them out thoroughly—this is the month that it can be done with the greatest prospect of killing them. Take the same precaution with your meadows already set—cut them off below the ground, and put some salt on the wounded roots.

If your meadows are *wet*, they should be ditched or drained, as *sweet* herbage will not grow on such soils, and the artificial grasses will always be supplanted by those of the sour tribe, which delight in watery beds.

Draining and Ditching.—Of all the months in the year this is the best adapted to this work. Let us advise all who have still grounds which lay low, and are consequently wet, to proceed forthwith to have them ditched and drained. By relieving them of superabundant water, the character of the soil will be improved both in its natural fertility and competency to be meliorated by manure. Manure, placed upon lands which are at all times saturated by water, renders but trifling service, inasmuch as the process of decomposition is so slowly carried on, as to be of little benefit, and for want of the required heat healthful vegetation cannot take place. Wherever practicable we prefer the blind or French drains.

Suckering and Sprouting.—Whether founded in true philosophy or not, this is the month of all others prefered for taking off the sprouts and suckers from bushes and the stumps of trees, and as there seems to be a virtue in following public opinion, where no harm arises from it, we would recommend all to sprout and sucker every thing requiring it this month, and instead of leaving them to encumber the earth, to put them in piles, to be burnt when dry. We are aware that all the sprouts and suckers usually found on a farm will not make much *ashes*, but however little, it is useful, and no farmer should neglect any opportunity of making and saving it.

Weeds.—The prudent farmer need not to be told, that every weed upon his place should be cut down and made into manure. Ten loads of weeds will, if placed layer and layer about with as many loads of earth, of any kind, and ten bushels of lime, convert the earth into as good manure as ever came out of a barn yard.

Turnips.—From what we told you last month, you are aware that you have not got any time to lose in the getting in your turnip seed. As we gave you ample directions then, we will refer you to those directions now, for information relative to their culture. With this reference we shall content ourself, with these injunctions—sow without delay—watch and drive off the fly, and cultivate your turnips thoroughly.

Potatoes.—Give your fall potatoes their last working; do it effectually; leave neither weeds, nor grass behind you, and leave the rest to time and that superintending care that always metes out even handed justice.

Buckwheat.—This grain may still be sown for grain, or to be ploughed in.

Sheep.—This is the season when the fly makes egg-deposites in the nostrils of the sheep—to prevent them, get you equal quantities of *salt* and *tar*, mix them together, and place them in a trough where your sheep can have access to it—in seeking a lick at the salt, they will smear their noses, and thus erect a barrier against the approach of the fly to their nostrils, and save themselves from the evil consequences of worm in the head.

Hog Pens.—Supply your hog pens with plenty of weeds in order that your hogs may be making you good manure. Let us pass into

THE GARDEN.

There is not a great deal to be done here, but still enough to justify the time to be devoted to a ramble.

Strawberry Beds.—If you intend planting out a bed of strawberries, it may be done the present month. If you have none already, buy some plants. If, however, you have plants, prepare your bed and set them out, taking care to plant when the ground is moist, and to keep the beds frequently watered. Clean out your old beds.

Cabbages.—Keep your earlier cabbages clean of weeds and the earth well stirred. Plants for winter cabbage which may not be already planted out, should be, the first wet season. The bed in which you place them, must be thoroughly manured and put in good order.

Radishes for fall use should now be sowed in some border not too much exposed to the direct rays of the sun; until the seed shall have come up, the bed must be watered twice a week, and subsequently, whenever there is a drought while the plants are young.

Lettuce and small Salading, of all kinds, may be sown, at intervals of three or four days during the month.

Celery.—The very first rain that comes plant out your celery plants. Should a rain not come within ten days, make a season by watering the bed freely. This watering must be kept up morning and night till a good drenching rain comes.

Asparagus Beds.—Be careful to cut down your asparagus, draw out the weeds and grass, and dig in a good dressing of rotten manure.

Beans and Peas.—You may plant each, or both of these for either table use or pickles. Green peas planted at this season may be pulled in the fall and kept for table use, throughout the winter. Peas sown now are not subject to the fly.

Brussels Sprouts.—As a spring sprout or greens, there is nothing superior to this vegetable, and as it is very productive, a very little bed will serve a large family. If you desire to have a supply next spring, now is the time to sow. Manure and spade your ground well, then rake and sow the seed, and finish by raking and rolling.

Early Yorks, &c.—If you wish to secure a supply of Early Yorks and other early cabbages, next season, about the latter part of this month you should sow your seed. Be careful to get *good* seed;—when the season arrives for setting out your plants we will jog your memory.

Canteloups, Mellons, &c.—Those who wish to secure a supply of *Mangoes*, for their own families, should, without further delay, plant a few hills of these.

Fruit Trees must be examined for insects, and the latter exterminated. If a sponge be dipt in sweet oil and fixed upon a stick you can destroy every insect within your reach by simply touching them with the oil. Oils of all kinds are fatal to the whole insect tribe. Having done the above, paint the bodies of your trees with a mixture of soft soap and flour of sulphur.

We have now directed your attention to every thing that struck us at the moment, and will make our bow, wishing you a pocket full of money and health to enjoy it.

SEPTEMBER.

Next him September marched eke on foot;
Yet was he heavy laden with the spoyle
Of harvest's riches, which he made his boot,
And him enriched with bounty of the soyle;
In his one hand, as fit for harvest's toyle,
He held a knife-hook: and in th' other hand
A pair of weights, with which he did assoyle
Both more and less, where it in doubt did stand,
And equal gave to each, as justice duly scanned.

This is the ninth month of the year—anciently it was the seventh, as its name imports, which is compounded of *septem*, seven, and *imber*, a shower of rain, from the rainy season usually commencing at this period of the year. Several of the Roman Emperors gave names to this month in honor of themselves, but, unlike the month of August, whose ancient name of Sextillis has been merged in that of Augustus, the name of September has outlived every other appellation.

The Saxons called this month "*Gerst-monat*, for that barley which that moneth commonly yielded was

September's come!
The sober Autumn, with a face serene,
Smiles bland adieu to Summer, like a queen,
Dismissing a gay favorite; the hum
Of bird and bee is still upon the breeze,
And though no leaves are fallen from the trees,
September's come!

Summer things!
Well may ye tune together all your notes,
To pour a song of mourning from your throats,
For briefer even than the reign of kings,
Is your swift dooming; cease your busy hum;
Droop, summer insects; for September's come
To close your wings!

Now hours and days
Go rolling by, and weeks away recede,
So noiselessly, that we may scarcely read
The calm, slow change of nature as we gaze,
Until the speeding season yellows o'er
And we look round for what was green before,
With fond amaze.

Still, need we sigh
That a bright season passes on its way,
While newness only springs from old decay?
Why mourn we over what has fallen—why?
While the old lesson chases us from youth,
Unheeded till we bow before its truth,
That all must die!

Yet are there some
Bright hues of summer left to gild the scene;
And long shall linger yet the summer green,
While o'er the glowing land the drowsy hum
Of insect voices, mournfully in night,
Sings fainter, lower to their old delight,
September's come!

It should be alike an object of pride and pleasure, as it is of interest, for every Agriculturist to be in advance with the work of his farm. The greatest benefits often result from such provident looking ahead, while, on the other hand, he that suffers himself to get behind with it, always finds himself on the stretch of anxiety to regain his position, thus working against every possible advantage of time, season, and feelings; for who can be otherwise than mortified when a neighbor calls to see one, if he catches him engaged in doing that which should have been done ten days or two weeks before. "*Procrastination is the thief of time,*" says the adage, and trite though it be, it carries with it a moral the no less valuable, because it is based on *truth;* for let the speculatist say what he may, in favor of his peculiar theory or system of ethics, none will stand the test of reason, unless its foundations be laid in this inestimable virtue. Following up the moral pointed by the adage just quoted, let us shun the habits of delaying until a future period that which ought to and can be done at the present, as we would the *Bohon Upas* of the East, whose fabled or real existence sends so many anxious cares to the deepest caverns of the traveler's heart. That frightful tree, if it have physical life, may, by its poisonous exhalations, dry up the sources of animal life; but farther its evils cannot go—it may dash its victim from the fulness of health and manhood to the grave—but there its vengeance is stayed. Not so the evils of delay to the farmer—for that delay is but the beginning of the end of a series of evils, as immeasurable in extent as disastrous in their consequences. *Delay*, therefore, should be expunged from the vocabulary of every one engaged in the cultivation of the earth—he who may have understood its meaning, should at once forget both its derivation and import, and henceforth show, by his practice, that he has substituted *go ahead* in its stead. With these

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anciently called *gerst*, the name of barley being given unto it by reason of the drinke therewithe made, called beere, and from *beerlegh* it come to be *berlegh*, and from *berlegh* to barley. So in like manner, *beerheym*, to wit:—the overdecking or covering of *beere* came to be called *berham*, and afterwards *barme*, having since gotten I wot not how many names besides. This excellent and healthsome liquor, beere, anciently also called *ael*, as of the Danes it yet is, (beere and ale being in effect, all one,) was first of the Germans invented, and brought in use."
So writes Werstegan, an old Saxon author.

brief remarks with respect to the danger of delay, we will claim your attention for a few minutes while we point out to you what ought to be done

ON THE FARM.

Fallowing of Ground.—Let all of your disposable force be put to the preparation of your ground for winter grain; the sooner this is done, the sooner will you be in that position which all of us should covet—that of being ready for the next. In ploughing, whether the land be intended for Rye, or Wheat, it should be ploughed deep; for, in our humble opinion, there can be no surer truth than this—that depth of furrow is essential to successful culture. Under concurring favorable circumstances, shallow ploughing may, as it often has, produced very satisfactory yields; but these are mere exceptions, and do not interfere with the integrity of our rule. We would plough deep, whether the ground to be broken up be a clover-ley—a grass sward, a stubble field, or, indeed, any other description of ground. By so doing, among other advantages we should calculate upon gaining these. 1. The burying the grass and weed seeds so deep as to be placed beyond the vegetating point, and the exemption of the succeeding crop from such pests. 2. By increasing the pasturage of the roots of the plants, we should calculate on their enjoying superior opportunities of growth and maturing. 3. Exemption from injury arising from excess of moisture 4. An earlier ripening of the grain, in consequence of the equable facilities afforded of extracting nourishment from the soil, as well as from the atmosphere, the first, owing to the expanded field opened to the roots, and the last, as the necessary consequence of the superior growth and elaboration of the stalk and leaves of the plants. 5. The restoration to the surface of much valuable manure, which by its own gravitation had been sunk beyond the beneficial action of sun and air. These are a few of the benefits arising from deep ploughing, sufficient however, of themselves, to settle the question of propriety. But we would likewise desire to call attention to another point. It is this. Let the master insist that no *baulks* be made in his ploughing. The ploughman, who leaves any, if they be but a few inches, should be called to account. Having got your ground ploughed deep, say from 8 to 10 inches, rolled and harrowed, so as not only to have a fine surface tilth, but a soil of some 5 or 6 inches of that character, without farther delay, go to work and get in your

Rye.—In covering, do it with the plough, and be sure to give a bed of 3 or 4 inches to your seed—follow the plough with the harrow, and that by the roller, so as that the seed may be so compressed as to come into immediate contact with the earth. This ensures an early germination and firm hold to the roots of the plants. And in order that the plants may have time to take deep root before frost sets in, and thus entrench themselves against winter killing, we would advise *early, very early* sowing. We would much rather encounter the evil of rankness than that of winter killing. Where the ground is not good, and other mild manure not attainable, we would certainly sow a bushel of plaster, or five of lime to the acre.

As to the *quantity of seed* to the acre, from 4 to 6 pecks may, according to the quality of the land, be sown. In seeding either grain or grass, it is always best to have *enough*,—the ground should be well stocked with the desired plants, otherwise you may expect to reap a crop of weeds.

Wheat.—As with many farmers this is the *money* crop—as it is one peculiarly liable to be taken off by disease and by insects,—and owing to these circumstances it is among the most important products of our country, we think it behoves every one, to do all within his power, to devise some *preventive* means to save this valuable crop from its enemies: as to *curative* ones, under our present belief, we look upon as being unattainable. The *preventive* means, which now suggest themselves to our mind, are these—1. *Early sowing—2. the use of Plaster, Salt, or some other substance calculated to prevent the too rapid supply of the nutritive manures, during the last two or three weeks of the growth of the plant. Deep ploughing*, would, in our opinion, exert a most valuable auxiliary aid in repressing the decomposition of the animal and vegetable bodies buried in the soil, thereby not only prolonging the supply, but regulating the quantity prepared for the support of the plants, and thus guarding them against those dangers of excess, which are supposed by some to lead to the rupture of the sap vessels, and, consequently, to the disease known as the rust. It may be said, that, by early sowing, though the ripening of the grain two weeks sooner in summer might be secured, yet that it would render the plant more liable to the autumnal visitation of its ancient and deadly foe, the *Hessian Fly,* and that any benefit to be derived from exemption from rust, would be more than counterbalanced by the injury to be apprehended, as likely to proceed from the full attack of that subtle enemy. For ourself we are free to confess that we would rather encounter the fly, than to throw the ripening of the grain upon that peculiar period of summer, when, from the frequency of rains, prevelance of close sultry nights and succeeding hot suns, unaccompanied by wind, the blight cannot fail to ensue. If the *sowing* be delayed until October, as is often the case, and a *warm fall* should supervene, we should have to run the same risk from the fly, as in ordinary seasons would result from a September seeding. At all events, we think that prudence would suggest the propriety of at least dividing the seeding between the two months. This would give a fair opportunity of testing the advantages and disadvantages of the two periods.

Quantity of Seed.—We think that in no case should less than two bushels to the acre be sown. This would not be too much if all came up, escaped the fly, and being winter killed. If you do not fill the ground with wheat plants, nature will supply the deficiency with weeds.

Preparation of the Seed.—Wash it in clean water whilever it discolors the water; then soak it in ley made of salt, or ashes, for twenty four hours, taking care to skim off all the light and imperfect seed and foreign bodies. Then dry it, by mixing the seed well with either lime or plaster, so as to prepare it for sowing.—There is no danger of the seed being injured by the soaks, though permitted to remain in them for several days, but the drying in lime should only be done in such quantities as can be sown the same day.

Mode of putting in.—All winter grain should be ploughed in, then harrowed and rolled. Care must be taken to run a sufficient quantity of water furrows to keep the plants dry through the winter, as it is destructive, to permit the roots to remain imbedded in water during that inclement season, and we have no doubt that a very heavy per centum of loss arises, annually, from this cause.

Destruction of Garlic.—To effectually destroy this vile pest, we would advise that any field infested with it, should be ploughed up shallow; this process will effect two desirable objects,—*first,* it will expose the roots upon the surface to the killing rays of the sun, by which means a large portion of them will be destroyed—*secondly,* it will place the seeds, which may have matured, in a position to vegetate promptly, and enable you, by turning them down, as soon as they shall have attained sufficient size, to destroy them by decomposition. But if you desire to make an effectual sweep of this deadly enemy of sweet pastures and cleanly grain, you should give them, if possible, a ploughing in mid-winter, so as to expose whatever roots there may be remaining to the deadly influence of the alternations of the thawing and freezing of the winter. Nor should you stop there, if the field were thickly set with the garlic, but carry your cleansing operations into a spring and summer's plough and hoe-crop.

Setting of Meadows and sowing Grass Seeds.—If the ground, in which you contemplate sowing your grass, be rich, it will, of course, need no manure; but if it be not in good heart, let us advise you to give it a heavy dressing of good strong manure, before you attempt to sow your seed. If you intend manuring, before you apply it, give your land a good *deep* ploughing, say, nine, ten, or twelve inches, *roll* it furrow-wise, and then *harrow* in the same direction; then apply your manure, plough it in about three inches deep, then roll and harrow as previously directed, then sow your grass seeds, *harrow* them lightly in with a harrow, and finish by rolling.

By the deep ploughing we recommend, you will bury the weeds seeds so low as not to allow of their germinating, and secure yourself a clean set grass field.

Quantities of Seed.—Of *timothy*, from 1 to 1½ peck of seed per acre, the latter quantity best. Of *orchard grass*, two bushels of seed per acre. Of *rye grass*, two bushels of seed per acre. Of *redtop*, one bushel of seed per acre.—Should any one desire a mixture, one half the quantity of either of any two of the above kinds will answer.

No one should attempt to lay down a meadow to grass to remain for years, without being satisfied in his own mind that it is rich, and, consequently, able to bear the annual demands that will be made upon it; nor should any one be content with a meadow that does not yield *two* tons of hay to the acre; but to ensure this, it must be in good heart at the beginning, and receive a top-dressing every second year.

Fodder and Tops.—Secure both of these at the right time. By all means you must not let your blades be burnt up before you pull them. But before you touch either, make a solemn promise, that you will not let them be wasted for want of care in curing and stowing away. If, when you are stacking your fodder, you were to add a little *salt*, say a peck to the ton, it would prevent it from becoming musty, and render it a much more acceptable bite to your stock. Indeed, if you were to stack it, as here directed, you might mix fully one-third its weight of *straw* with it, with the certainty of making the latter just as acceptable to your horses as hay.

Weeds.—If you have a spare hand and a cart and horse, we are very sure you could not occupy their time half so profitably, as in the collection of weeds for the hog pen and cow yard. Indeed, if you have any suitable fields whereon there are a luxuriant growth of weeds, have them mowed without delay, and mixed up with earth and lime to form a compost, or have them carted to your pens and cow yards.

Thrashing out Grain.—Without farther delay, if you have not already done so, get out your grain and send it to market at once—every week's delay will but serve to depreciate its value.

Culture of Turnips.—Run your harrow freely through your turnips, unless they have been already worked—be sure to give them at least two thorough harrowings, or weedings with the hoe.

Late Potatoes.—If you have not already given your late potatoes their last working, do so without delay, for there is no crop that better pays for cleanly culture than it, nor is there one that more delights in a full supply of sun and air.

Hogs.—If you have no hogs in pen, have some forthwith placed there, and make it a part of your daily business, to see that they are well supplied with the leaves of vegetables, weeds and loam from the woods, to be converted into manure by them. Ten hogs kept busily employed in this way till killing time would make thirty loads of good manure.

Fences.—Subject your corn-field fences to a rigid examination; see that all the weak points are promptly repaired, so that none be left to provoke the assaults of your own or neighbors' stock. Recollect that cattle, as the grass gets *thin*, become restless, and are apt to seek in corn-fields for the plenty denied them in their own pastures.

Salting Stock.—Mix equal parts of salt and lime together, and give it twice a week to every description of stock.

IN THE GARDEN.

Spinach.—If you desire to lay the foundation of a supply of this excellent vegetable for next spring, now is the time that you should sow the seed—the earlier done, this month, the better chance of its succeeding well. The best sort for sowing at this season, is the prickly kind, because of its superior hardness. After you have prepared a bed, which must be heavily manured, dug well, and thoroughly raked, sow the seed, either in drills, or broad cast—tread it in, then rake the ground effectually, so as to cover the seed. When the plants are up and have got leaves an inch long, they must be weeded and thinned so as stand 4 inches asunder.

Early Cabbage.—Those who would secure a supply of cabbages for *early* summer use, next year, should, from the 1st to the 10th of this month, sow on a good rich border as many of the following kinds as they may want, viz: *Early York*, *Smyrna*, *Early Russia*, *Early Buttersea*, *or Early Bullock's heart*,—and with a view to securing a continuous supply it will be well to sow, also, some of the Large Drumhead, or flat Dutch. When the time for setting them out arrives, we will tell you how to do it, so that they will live through the winter and afford you good well headed cabbages in June next for table use. If you have never yet attempted to raise them, you cannot begin younger, and as there is positive comfort in having a full supply of early vegetables, we could wish you to lay aside *old fashioned* notions for once, and take steps to eat early cabbage of your own raising next summer.

Cauliflower seed may be sown from the 29th to the end of this month, to be subsequently transplanted into frames.

Lettuce may be set out, if you have the plants, and if not, sow in good warm borders.

Radishes.—Continue for a few days to sow all the winter varieties of radishes.

Celery.—As this vegetable advances in growth, it must be earthed up—in doing which great care must be taken not to cover up the hearts of the plants

Cresses, Corn Salad, Chervil, and, indeed, all sorts of small salading, may be sown any time during this month.

Seeds of all kinds, as they may ripen, must be gathered, and put to dry in the shade. As soon as they are hard enough to clean, the seed should be beaten out, cleansed and put away.

Herbs of all kinds may now be transplanted.

Strawberries.—If you are solicitious to add to the comforts of your family have a bed prepared and set it out with strawberry plants. A few beds, four feet by 20 will give you as many strawberries as you, your family, and visiters, can consume. Manure the piece of ground you may allot for a strawberry bed heavily, dig in the manure fully a spade deep, then manure again, and dig it about four inches deep—lay off the piece into beds 4 ft. wide, draw lines 1 foot apart, and insert the plants 8 inches asunder. Water the plants every evening until they take root, or you may be relieved from that duty by a good drenching rain. To prevent the growth of weeds, and maintain moisture, lay straw an inch thick between the rows, taking care to place stones or bricks upon the ends to prevent its being blown away.

Budding and Inoculation of fruit trees must be attended to this month.

Gooseberries, Currants, and Raspberries, may all be propagated this month, either by layers, or cuttings—it would be best, however, to delay the operation until towards the end of the month.

Preparation for an Orchard.—If it be your intention to plant out an orchard this fall, we would remind you, that it is *now* time to begin to get the ground ready for the reception of the trees. At all events, the ground should be ploughed twice before the trees are planted out—*now, and just before that operation.* It would, however, be better if you could give to that portion of the ground, whereon the trees may be planted in line, a subsoil ploughing for about ten feet wide, so as to allow a range of five feet, on either side of the trunks of the trees, for a range for the roots.

HEADING CABBAGE IN WINTER.—When it is time to gather Cabbages, we always find more or less of them that have not formed any heads. They may have grown well and have a large stock of leaves, but have not closed up in the form necessary to make a good, solid, compact cabbage.

A farmer friend of ours, (says the Maine Farmer,) has practiced for many years the following method, which effectually closes these loose leaves in the course of the winter, thereby furnishing him a supply of the best kind early in the Spring. In the fall of the year, just before the ground closes up, he gathers all the cabbages which have not headed, together. He then digs a trench eighteen inches or more deep, and of sufficient width to admit the cabbages. He then closes the leaves together by hand, winding a wisp of straw or something else around them to keep them together; and then puts them into this this trench, with heads down and roots up. He then packs straw or leaves, and earth snug about them, and rounds up the earth over them. The trench should be dug in a place where the water of the rains and the snows run off and will not stand about them. A board, or a couple of boards, nailed together in the form of a roof and put over the mound, may be useful.

In the spring of the year, open your trench and you will find that your cabbages are all headed firmly together, and if the water has not got in, will be solid and hard. We once *tried* a few heads formed in this way which were very nice. By following this plan, we not only preserve the cabbages well during the winter, but save much of the crop which is considered worth but a trifle.

Should we have omitted any thing, which ought to be attended to, supply our omission—but above all things, *see, yourself*, that every thing you *order*, is not only done, but done well; for unless you set an example of faithfulness, assiduity, and care-taking, you have scarcely any well grounded hope to expect that your interest will be attended to by those under you.

OCTOBER.

Then came October, full of merry glee,
For yet his soule was totty of the must,
Which he was treading, in the wine fat's see,
And of the joyous oyle, whose gentle gust
Made him so frollick, and so full of lust:

Upon a dreadful scorpion he did ride,
The same which by Dianæ's doom unjust
Slew great Orion; and eeke by his side
He had his ploughing share, and coulter ready tyde.

This is the tenth month of the year. It was the eighth month of the old Roman year, which began with March. The commencement of the year was transferred by Numa Pompilius to the 1st of January, but the months retained their names.

"October had the name of *Wyn*—monat" from the Saxons, *wyn*, signifying wine; and albiat they had not anciently wines made in Germany, yet in this season had they them from divers countries adjoining." They also called it *Winter—fulleth*.

Autumn.

THERE's a pensive tone in the Summer's rest
When the Season's work is done,
When the vernal toil with the fruit is blest,
And the blade and the ear are gone—
There's a touching tone in the changing leaf,
A voice in the meadows sere,
In the rustling maize, in the gathered sheaf,
A voice in the waning year—
There's a silver haze in the mid-air hung,
A gentler breath on the air,
A chastened light on the landscape flung,
A mellowed beauty there.
I love to thread 'neath an Autumn sky
My way through the arching wood,
When the frost-tinged leaves in my pathway lie,
Or fall in the golden flood,
I love to gather the nuts which fall,
And hark to the surging sound
Of the squirrel's leap, when through chesnuts tall,
He springs with a reckless bound.
I love to cull from some aged stone
The moss in its velvet pride,
Or list to the soft and lulling tone
By the rippling streamlet's side.
I love to rest 'neath some aged oak,
On the trunk of a fallen tree,
Where the silence deep alone is broke
By the hum of the passing bee.
There's a grateful spell in a lonely hour,
A joy which the silence gives;
When the voice of the world hath lost its power,
'Tis then that the spirit lives.

* * * * * * *

The orange robe on those Maple trees,
And the Beechen's Tyrian dye,
When swept, alas! by the wintry breeze,
Will fall and unheeded die.
The fading flower, the falling leaf,
Proclaim in a silent tone;
The running stream and the gathered sheaf,
All speak of a Summer flown.

OCTOBER, with all its pressing demands upon the husbandman, is here. The toils of this month are no less numerous than important, both as regards the present and the future. In all the operations of the farm, like those in every other department of human callings, the interest and well being of individuals, as well as those of the community at large, are best subserved by timely attention to the discharge of those duties which from time to time are devolved upon us by our pursuits. Indeed, so far as the business of agriculture is concerned, promptness in action is often indispensable to success, as the delay of even a few days may be productive of serious and irremediable injury, at least for the season. Reminding you thus briefly, of the necessity for doing things at the right time, permit us to point out such objects as should command immediate attention. We will begin with those

ON THE FARM.

Wheat.—Presuming that you have been sufficiently careful of your interests to prepare the ground you destine for your wheat crop, and assuming it as a fact, that it is ready for sowing, we will remark to you, that the sooner the better you commit your seed to the earth, as by *timely* sowing you may enable it to escape the *rust* next summer. Perhaps you may say, that, by too early sowing, you may subject it to the ravages of the Hessian fly; but with a full knowledge of that evil, our judgment tells us, that we would rather run the risk of that destructive enemy, than to encounter the danger of having our harvest destroyed by the former, by throwing the ripening of the grain upon that period of the summer so prolific in the generation of rust, owing to the then existence of those physical causes, believed by so many as the promoters of that disease. If by sowing two weeks earlier than usual, we can prevent the assault of a foe so disastrous in its consequences, prudence would certainly dictate that we should at least make an experiment with a part of our crop. With this invocation to early sowing, let us say a few words with respect to the

Preparation of the Seed.—Before sowing, the seed wheat should be, *first*, well washed in clean water, the grain to be thoroughly stirred with a birchen or other broom until the water ceases to be discolored: it should then be put in a soak of ley made with *ashes*, *stale urine*, salt or lime water. While in either of these soaks, the grain should be stirred, so as to give the faulty grains a chance of floating; all grains which float should be skimmed off and given to the hogs, as they are defective, and would not germinate. After the seed shall have remained in the soak for 12 or 24 hours, it must be taken out *as wanted*, dried in *slaked lime*, plaster or ashes, and sown as soon thereafter as possible. There is no danger of the germinating powers of the grain being impaired, while it remains in the soak, but the farmer must be careful to take no more out each day than he can sow, as we have known its vegetating powers materially injured by remaining over a day or two unsowed.

The strength of the soak should be tested by an egg; whenever it floats an egg, it is strong enough. By washing, soaking and drying, as we recommend, you will be sure to save your next year's crop from the *smut*, while the seed itself will imbibe enough of the stimulating principle from the saline mixture in which it may be soaked, to give it a prompt and vigorous growth and expansion of the root at the onset.

The seed should be ploughed in three or four inches deep; after which we would recommend that one bushel of plaster, five of lime, or ten of spent ashes, to the acre, be sown thereon, which should be harrowed in. Then let the field have water drains run through it, so as to lay the wheat up in dry beds of proper widths, and finish by rolling across the drains so as to give them a facing to resist the washing of the rains.

Quantity of Seed per acre.—In consideration of the great loss by winter killing and spring spewing, we think it unsafe to sow less than *two bushels* to the acre, as any land calculated to grow a crop of wheat is competent to sustain the plants which will spring from that quantity of seed. Indeed, we have long believed that one cause of the smallness of our yields, arose from the want of a sufficiency of seed to cover the ground to the exclusion of weeds, which we all know is sure to spring up and occupy every spare inch of soil.

Rye.—If there be any who have delayed sowing their Rye let them get it in with all possible despatch, and be sure to plough in the seed, harrow, drain and roll it as we have advised for wheat.

Quantity of Seed per acre.—Less than *four* pecks to the acre should not be sown, and *five* would, at this late period, prove the better quantity.

Pumpkins.—These should be gathered before the frost has time to injure them, put away in a dry place, and fed out as required. In gathering and being carted in, care must be taken not to bruise them, by which means they will keep sound much longer.

Preservation of Pumpkins.—Gather as many of your best matured pumpkins as will suffice to supply your stock with a mess daily through the winter, and deposite them carefully in a close and secure place, according to the following directions: 1st, lay a stratum of butts of straw from the threshing floor, one foot thick; on this stratum deposite another of pumpkins, and cover them with another layer of straw, and so on to the end of your heap. In this way pumpkins may be preserved most of the year, as sweet and fresh as when taken from the field. Try it, friends, says the Massachusetts Ploughman, and do not leave everything to be discovered by accident, as is the case with experiments in agriculture generally.

IN THE ORCHARD.

As your fruit may be ready, gather it carefully, by hand-picking. Be careful also, to do this in dry weather. After gathering, put it away in some dry, clean apartment; lay them in heaps, each kind separate by itself. After they shall have lain in heaps about two weeks and gone through the process of sweating or transpiration, have them wiped dry with a clean cloth, and then put them away.

The following practical observations, contained in a letter from NOAH WEBSTER, have been published in the Massachusetts Agricultural Repository:

"It is the practice with some persons to pick apples in October, and first spread them on the floor of an upper room. This practice is said to render apples more durable, by drying them. But I can affirm this to be a mistake. Apples, afterr emaining on the trees as long as safety from the frost will admit, should be taken directly from trees to close casks, and kept dry and cool as possible. If suffered to lie on the floor for weeks, they wither and lose their flavor, without acquiring an additional durability. The best mode of preserving apples for spring use, I have found to be, the putting of them in dry sand as soon as picked. For this purpose, dry sand in the heat of summer; and late in October, put down the apples in layers, with a covering of sand upon each layer. The singular advantages of this mode of treatment are these:—1st, the sand keeps the apples from the air, which is essential to their preservation. 2d, the sand checks the evaporation of the apples, thus preserving them in their full flavor; at the same time, any moisture yielded by the apples, and some there will be, is absorbed by the sand, so that the apples are kept dry, and all mustiness is prevented."

Fall Grafting.—An old friend of the publisher, who has forty years experience as an orchardist, handed us the following article, which he pronounced "good," and desired that it might have a place in our book.

Capt. Josiah Lovett, who is distinguished for his success in raising superior vegetables and fruits, gives in the Magazine of Horticulture, his mode of fall grafting, by which he is enabled to get fine fruit from the scions the next season.

"Your remarks in the November number of the Magazine, for 1843, page 423, respecting my mode of procuring the specimens of fruit presented on several occasions at the Horticultural Society's rooms, last autumn, is partly incorrect; they were not procurred by budding, but by grafting. I have practiced budding with fruit buds for some eight years past, and occasionally succeeded in getting good fruit from them. It is now three years since I have began grafting with fruit wood in autumn, (and I never heard of any person attempting it previous to that time,) thus far I have been eminently successful with the pear and apple, (occasionally with the plum;) the grafts thus set have been more certain to mature their fruit, than the trees from which the grafts were cut; this can only be accounted for by supposing the sap to flow slower in the graft in the spring, in consequence of there not having been a perfect union with the stock in autumn; and the grafts not blooming or setting their fruit, quite as early in the tree from which they were cut, escape the injurious effects of our late spring frosts and cold north east storms, to which in our climate we are so subject.

I select a healthy shoot for a scion, with fruit buds on it, I have them set a foot long with one or two side shoots. Immediately remove the leaves, and cut on one side in a sloping direction, to a point, the cut from one to two inches long; then with a sharp knife I begin at the point and cut just within the bark, up about half an inch above the commencement of the incision on the opposite side; then select a thrifty upright shoot, on a healthy tree, cutting well back, taking a short stump, cut this stump in the manner as the scion, reversed; and carefully but firmly bush one with the other; secure with bass or Russia matting, and cover with clay; or I prefer to mix equal parts of beeswax and Burgundy pitch, a less quantity of rosin will answer in the room of pitch; soften to a proper consistency with hog's lard, and melt together, and spread on cotton shirting; and then cut in strips of one half to three quarters of an inch wide, and after uniting graft and stock, bind with this the cotton side next to the bark. The composition ought not to come in contact with the bark, as the bandage should be left on through the winter. If the grafts are carried any distance before uniting to the stock, it will be very important that the leaves be cut off under the tree, and the ends, as soon as possible, dipped in wax or something adhesive.

THE GARDEN.

Cabbage Plants.—Did you take advantage of the timely notice we gave you, to sow cabbage seed to secure an early supply of cabbage next summer? If you did, the time has arrived now for planting them out, and in order that you may have no excuse, we will tell you how to do it. Manure the ground you allot for them well, with good strong stable manure; dig it deep—the full depth of the spade—rake it fine, so as to thoroughly pulverize the earth. The spot selected should lay *dry*. Stretch your line across the bed, east and west, with a hoe, make a furrow hill four or five inches high, plant your plants on the north side of the furrow, about a foot asunder, the furrows to be two feet apart, fill up the hollow in the furrow with *long* stable manure, and next season, early, you may calculate upon a supply of cabbages.

NOVEMBER.

Next was November; he full grown and fat,
As fed with lard, and that right well might seeme;
For he had been a fattening hogs of late,
That yet his browes with sweat did reek and stream,
And yet the season was full sharp and breem;
In planting eeke he took no small delight,
Whereon he rode, not easie was to deeme
For it a dreadful centaure was in sight,
The seed of Saturn and fair Nais, Chiron hight.

This is the eleventh month of the Julian year; but the ninth of the old Roman year, which began with March. The Anglo Saxons gave names in their own tongue to each month, and "November they termed *wind monat*, to wit, wind moneth, whereby we may see that our ancestors were in this season of the year made acquainted with blustering Boreas; and it was the ancient custom for shipmen then to shrowd themselves at home, and to give over sea-faring, (notwithstanding the littlenesse of their then used voyages,) until blustering March had bidden them well to fare." They likewise called it *blot monath*. In the Saxon "blot" means *blood;* and in this month they killed great abundance of cattle for winter store, or, according to some, for purposes of sacrifice to their deities.

Winter.

Merry, hale, rough, crusty old WINTER will soon be here. His usher, the noisy wind, has already announced him, and caps, cloaks and bonnets, on man, woman and child, assures us that preparations have been made for his reception.—The fireside begins already to assume that cosey look, that it can only have when the world outside is waste and dreary. Is it not comfortable? When the windows creak, the shutters crash, and the cold winds moan and shriek, to be seated by the blazing hearth, or piping stove, reading an instructive Book, such as the one you have in hand, or some good Family Newspaper, which brings the multiform events and doings of THE WORLD in review before you!

We like the Winter time.—It has a thousand charms and blessings mingled with its severity and gloom. It is pleasant to stand at the window and watch the snow flakes whirling about in the storm. "The fleecy, feathery snow."—How lightly it falls—how beautiful it looks! Why, you cannot imagine beauty without likening its brows to snow. Odd, since we never desire beauty to be so cold. —If women's brows were ice, there is genial warmth enough in their eyes and hearts to melt it. How merrily jingle the bells as the active horses and gliding sleighs pass along, and what hearty "hurrahs" of delight are heard gushing from lungs unchilled by the frost of age or winter.—"Home, sweet home," thou art pleasant at all times, but doubly so in Winter—at least to those of us who have homes to go to.

But the Poor, reader—the POOR! What is to become of them, in this cold Winter that is coming? Where will be the homes of the destitute—the houseless Widow and Orphan—the children of Misfortune—the Drunkard's family, the helpless dependents upon him who has squandered his substance and given his last farthing for drink! No warm rooms or blazing hearths for them.—How many women and children will nestle together, half freezing through so many long nights, ere "the cheerful spring comes kindly on!"

Remember that Winter is terrible to the helpless Poor—that in the season of your pleasures and holidays, they may be suffering.—Have mercy on the poor.—Give heed to the touching lines of ELIZA COOK:

Winter is Coming.

Winter is coming! who cares? who cares?
  Not the wealthy and proud, I trow:
"Let it come," they cry, "what matter to us
  How chilly the blast may blow?"

"We'll feast and carouse in our lordly halls,
  The goblet of wine we'll drain,
We'll mock at the wind with shouts of mirth
  And music's echoing strain.

"Little care we for the biting frost,
  While the fire gives forth its blaze;
And what to us is the dreary night,
  While we dance in the waxlight rays?"

'Tis thus the rich of the land may talk;
  But think, oh, ye vaunting great,
That the howling storm YE laugh at within
  Falls sore on the POOR AT YOUR GATE.

They have blood in their veins, ay, pure as thine,
  But nought to quicken its flow;
They have limbs that feel the whistling gale,
  And shrink from the driving snow.

Winter is coming—oh! think, ye great,
  On the roofless, naked and old;
Deal with them kindly, as man with man,
  And spare them a tithe of your gold!

IN entering upon this the last autumnal month, it may not be inopportune to remind our readers, that there are many things to be done and duties performed during its continuance, in order to give assurance to the success of their labors during the approaching year. Let us direct your attention to a few of the duties which devolve upon you. We will commence

ON THE FARM.

Wheat.—It may be that, owing to the season, you have been unable to get in your wheat. If so, use all possible diligence, exert all your energies to get it in as speedily as possible—for, although it is very late, and we never would advise, under ordinary circumstances, that this grain should be sown so late, still as necessity has no law, we deem it better to put it in even now than to forego sowing altogether. But in getting it in, we certainly would advise deep ploughing. Should the season prove mild, and next Spring and Summer prove favorable, good crops from grain sown even as late as this *may* be obtained, though the chances are not, in our estimation, very flattering.

Rye.—If from the same cause, or some other, your Rye be not seeded, there is yet time to put it in. Although we would advise the seeding of the grain in September, still when delayed thus late, we would not despair of a crop, as we have known a good one to occur from a sowing as late as the 24th of November. The seed was ploughed in four inches deep, and never made its appearance above ground before the March following.

Fall Ploughing.—We would call the attention of such farmers as may have stiff clayey grounds, which they intend to cultivate in the spring, to the importance of giving them a fall or winter ploughing, as a means of bringing them into a state of mellowness. As we have repeatedly pointed out the advantages to result from the exposure of such lands to the operation of frost, we will not iterate them here; but before we close this paragraph we would respectfully suggest the propriety of making an experiment of at least an acre in all fields of the character named, by giving it the advantage of a subsoil ploughing. Those who may do so will by comparison with the remainder of the field and it, test the efficacy of the process and be able to ascertain how far such ploughing comports with their interest. In grounds addicted to being wet, we believe it would add fifty per cent. to their productiveness, while it would improve the character of all tenacious soils.

Fattening of Hogs.—See that the hogs you may have up fattening are well attended to. Regularity in feeding, watering, salting, &c., are quite as necessary as food itself, and has the effect not only to shorten the period of feeding but to save food.

Breeding Sows should receive additional care and food, as the woods afford but a stinted allowance after the consumption of mast.

Cattle of all kinds should be sheltered, if possible, of a night, and receive generous allowances of fodder of some kind, as neither the pastures nor woods afford, at this period, a sufficient quantity of food to prevent the cattle from falling off in flesh, a thing which should be obviated, as it is highly important to commence the winter with them in good condition and vigorous health. Cattle thrive best in cold weather in good dry warm lodgings, where they may bid defiance at least to the rain and snow. We don't say that a close stable is indispensable to their health and comfort, but we do affirm that a good shed, facing the south, with a tight roof, defended from the north and west, tends greatly to promote not only their comfort and health, but enable them to live upon less food. See too to their being salted twice a week.

Gathering Corn.—As soon as your corn is thoroughly dry, gather it, have it husked out and put under lock and key.

Corn Husks.—As you may have your corn husked, have your husks carefully packed away in some safe place, taking care to sprinkle a little salt over them. Thus stowed away they will prove excellent food for your milch cows.

Corn Cobs.—We have frequently told you not to let these go to waste, and we repeat it here that there is as much nutrition in a bushel of cobs as there is in two fifths of a bushel of shelled corn. This is not guess work, but the result of actual common sense trials, so conducted as to reduce the thing to a certainty. Why then, we ask, should they not be husbanded, as among the available feeding resources of a farmer? Why should they be wasted? Why should not every farmer rather provide himself with a crusher, and thus enable himself to use them in the most profitable way. Those, however, who have no crusher, may have them broken in the hominy mortar. Thus managed, if soaked in boiling water, steamed, or boiled, they will be brought to a condition easy of digestion by cattle, and if fed in this way to milch cows, will be far more valuable, measure for measure, than the best hay, no matter what the kind may be.

Corn Stalks.—This is another valuable provender, which is permitted to be wasted. A ton and a half of corn stalks, cut up and soaked is as good if not better than a ton of the best hay for milch cows. And it is not claiming too much to say, that cows thus fed upon them will look as well and give as much milk as when fed upon any other long fodder. Preserve your corn stalks, and feed them out to your cows, and you may sell more hay.

Barn and Cattle Yards.—Cover these a foot deep with mould, leaves, and vegetable rubbish of any kind, and by spring your stock will have converted every spadeful of it into as good manure as that made by your horses, for it will have absorbed and preserved their liquid salts, every gill of which is prolific of all the elements of vegetable nutriment.

Hog Sties.—Give your store and fattening hogs plenty of mould, leaves, straw, in fine plenty of every thing calculated to ferment and make manure.

Horses and neat Cattle.—The time has arrived when these should be cared for. In all the attentions they may receive recollect that regularity in the hours of feeding is a material element in the success of any plan. Both horses and cattle should be salted twice a week—a little good well sifted hickory ashes, if mixed with the salt, once a month, would be a judicious addition.

Sheep.—These animals should be provided with an open shed with a southern exposure, in which they can lay dry and comfortable, receive salt twice a week, and good hay or fodder and roots, three times a day.

Colts and Young Cattle.—Recollect that if you stint young animals you stop their growth—feed well and provide cleanly apartments.

Apples.—Have your keeping apples carefully picked by hand, and after going through the process of sweating have them put away in a dry place where they will not freeze.

Cider Making.—Let this work meet early attention.

Apple Orchard.—Examine your apple orchard and treat the trees as we have already advised you, and recollect that by neglecting your duty you may destroy your orchard altogether.

Planting out of Orchards.—This is a good period for this work with all, perhaps, but the stone fruits; but before you attempt such an important duty, consult your mind well and ascertain whether there is that in you that will enable you to take care of the young trees—if there are, plant—if not—don't plant, for it is worse than a mockery to set out an orchard of choice young trees and then leave them to die, or to live as so many records of your want of care. If you plant—*set out none but the best fruits.*

Draining and Ditching.—These operations should be attended to.

Roots of all kinds, if not already taken up, must be forthwith—and, as dug, carefully stowed away in some safe place.

Fencing.—Look to your fences, repair where necessary, and make new ones where they may be required.

Tools and Implements.—See that every thing in this way, not in use, be taken out of the weather and carefully housed.

Fire Wood.—Give an eye to the procurement of this, and as chopt up in the woods have it drawn home and piled away. Let us now take a peep

IN THE GARDEN.

Though there may be not much to do here, still there is something, and after having made them it is but proper that you should take care of your vegetables.

Roots.—Let these of all kinds, if you have not already done so, be taken up and put where the frost will not touch them.

Cabbages.—Before the hard frosts set in, these must be taken up and carefully put away.

Asparagus Beds.—If you have not already cleaned off these, do so without delay.

Strawberries.—If you desire to set out new beds of these, there is still time, provided you go at it without further delay, and take pains to cover the plants with straw when winter comes on. But you must manure well. Beds planted now will yield fruit next year, provided you clean and work them well on the opening of next spring.

Garden Herbs of all kinds may still be set out.

Gooseberries, Currants and Raspberries may still be transplanted.

Bulbous Roots should now be planted out in beds.

Dahlias, Tuberoses and kindred bulbous plants must be taken up.

Small Salads, Spinach, &c., should now be thinned out.

Flowering Shrubs of all kinds may be set out with the certainty of blooming next season.

DECEMBER.

And after him came next the chill December;
Yet he, through merry feasting which he made,
And great bonfires, did not the cold remember:
His Saviour's birth so much his mind did glad.
Upon a shaggy bearded goat he rade,
The same wherewith Dan Jove in tender years,
They say was nourished by the Idæan may'd;
And in his hand a broade deep bowle he bears,
Of which he freely drinks an health to all his peers.

SPENSER.

This was the tenth month in the calendar of the ancient Romans, who began the year with March. It takes its name from the Latin word *decem*, ten. With us it is the twelfth and last month of the year. By the Anglo Saxons it was called *winter monat*, to wit, *winter moneth;* but after the Saxons received Christianity, they then, of devotion to the birth time of Christ, termed it by the name of *heligh monat*, that is to say, *holy moneth*. They also called it *midwinter monath* and *giul erra*, which means the former or first *giul*. The feast of Thor, which was celebrated at the winter solstice, was called *giul*, from *iol*, or *ol*, which signifieth *ale*, and is now corrupted into *yule*. This festival appears to have continued through part of January.

Before entering upon our detail of the labors of this month, it may be well to ask you to take a retrospective glance with us at your management of your farm during the past season, as it is profitable to re-examine what has been done, in order that we may avoid in future the repetition of those errors of judgment and practice we may have committed, and which tended either to decrease yields of product, or to prevent the improvement of the soil. The best and most experienced among us have, doubtless, in the course of our operations made mistakes, or omitted to improve opportunities, which presented themselves, of advancing our interest; by a careful review of our past operations then, it is within our power not only to discover wherein we may have erred, but to apply the necessary corrective to guard us against similar occurrences in future. When *duty* as well as *interest* points so unerringly to the adoption of such a course of procedure, it would be a reckless resistance to the promptings of our nature, were we to cast aside the lessons taught us by the experience of the past—march blindly onward, heedless of the consequences of our former blunders—or adhere to systems which may have proved injurious, merely because they may have been sanctified by age, or handed down to us by those whose memories we cherish in fond recollection. We are not among those who would advocate *change* for mere change sake, but where an old system can be supplanted by a better, we certainly should be faithless to ourself were we not to adopt it. There are faults among all classes of men—to err is incident to our very nature. Such being the case, it is but reasonable to conclude. that the cultivators of the soil do not form an exception to the general rule, but that, like their brethren of other pursuits, they have failed to fulfil portions of the obligations of their stations, and omitted to embrace many opportunities, which presented themselves, by which their conditions might have been bettered. We desire no man to confess to us, nor will we play the part of an inquisitor; but a question or two present themselves as being so germain to the subject, that we will hazard the responsibility of putting them.

Did you avail yourself of every opportunity which occurred during the present year, of increasing your manure pile?

Did you adopt any plan of preventing loss by evaporation, or rain, of that which you did make?

If you are able to answer us in the affirmative to both these questions, then we are prepared to award you the title of a careful husbandman; but if you respond to us as hundreds have often done before, that you had neither *time* nor the *force* to devote either to the acquisition or protection of manure, we fear we shall be compelled to withhold from you that proud distinction, as no man can have just pretensions to it, who fails in the discharge of duties of such vital importance to his well being. To attempt to cultivate land to advantage, without giving to it periodical dressings of manure, is as great a fallacy in the farmer, as is that which is committed by him who expects to find the happiness and comforts of the domestic hearth in the Bachelor's Hall—the soil cannot be maintained in its fertility, unless that which is extracted from it in the form of products, be restored to it in that of substances competent to be converted into nutrition—neither can true happiness, or the comforts of home, emanate from any domicil, wherein woman is not armed with the panoply, and clothed with the powers of wife.

Turning from these reflections let us now ask ourselves what is to be done

ON THE FARM.

Corn.—We take it for granted, that you will have gathered your corn before this time, but if this be not the case, let us advise you to house it with all possible despatch, have it in your crib, husked and put under lock and key with the least delay, as the *longer* it remains in the field, the *shorter* will your crop prove. There are other animals besides the beasts of the field, who *trespass* upon the cornfield and appropriate to themselves that for which they had never toiled, and who eat the bread which had been gained by the sweat of another's brow—and what, if you should catch them in the act of *taking*, can you do? It is no *felony*—no *theft*—but a mere trespass, though they were to deprive you of half your crop, provided they found it on the stalks standing in the field, and pulled and carried it away without leaving your premises previous to the carting or waggoning of it off. This is the *law* by which the interest of corn planters are protected, but so far from its being *justice*, it is an incitement to villainy.

Feed for Stock.—Examine your hay, fodder, and other provender, and see if you have a full and ample supply to carry every thing on your farm in the shape of a dumb beast through the winter and spring up to the 15th of next May—when we say carry them through, we mean with three good feeds daily, from this time until that period. If you have such supply, you can of course sleep easily in your bed, without making any farther effort to provide more. But if you entertain the slightest doubt upon this head, make arrangements to have your cornstalks hauled in and protected from the weather. If cut up and steamed, they will prove, pound for pound, equal to so much hay for your oxen and cows. Indeed we are not sure that for all the purposes of encouraging the secretion of milk, they are not better.

Fattening Hogs.—Push ahead with the fattening of your hogs; feed them regularly; salt them twice a week; give them charcoal as often; see that they are regularly watered, and don't forget to have them provided with plenty of materials to convert into manure.

Store Hogs and Breeding Sows.—Let these receive additional attention as the weather increases in coldness. Recollect that warm, clean, dry lodgings, conduce not only to their comfort but health, as well as to your profit. Hogs should be lodged through the winter in covered pens, and they should, at least once a week, be supplied with fresh leaves or straw.

Milch Cows.—These animals besides being foddered twice, or thrice a day, should receive, night and morning, a generous allowance of roots or slops. He that expects a cow to give a pailful of milk on dry hay, or straw, has credulity enough to become a believer in the doctrines of Miller.

Litter for Stock.—Let your horses, cows, oxen and sheep be well littered; recollect that, for every ton of straw you appropriate to this purpose, they will return you in the spring *four* tons of good manure, that being the proportion in which they reciprocate such favors.

Horses.—Let all your horses be stabled, fed curried, watered, and well bedded. See that what you allow them is faithfully given them; that besides their feed they receive, once a week, during the winter, half a pint of flaxseed meal, and that they also receive twice a week, a handful of salt in their victuals. Recollect, too, that their food should be alternated between dry and chopt.

Mares and Colts.—These should be liberally fed through the winter, and you should make it a point to have the latter treated with kindness and used to being handled early, as such treatment tends to make them docile and easy to break.

Work Oxen.—Bear in mind, if you desire that your working oxen should be in a condition to labor, that they ought to receive daily allowances of grain in addition to their long feed; that the curry-comb, or card, is essential to their health and comfort—and that they should be provided with a good bed and dry lodging.

Orchards.—Gather your apples, put them carefully away, then prune your trees of all suckers and dead limbs. In pruning, cut down to the sound wood, make an even surface, and cover the wound with a mixture of equal parts of fresh cow dung and clay, which should be capt with a cloth—or make a composition consisting of five parts of pitch, one of turpentine and two of beeswax, melt the whole together and add as much sifted ashes to the mixture as will make it of the consistency of paint—cover the wound with this, and dash sand over it, which will make a covering impenetrable to water. If the trees have moss over them, rub it off with a hard brush, and apply a paint made of soft soap, flour of sulphur, salt and fish oil, to their trunks.

We have briefly noticed the things to be attended to on the farm, and will now call your attention to those

IN THE GARDEN.

Cabbage, Lettuce, and Small Salads.—Seeds of all these may now be sown in hot-beds for transplantation in early spring.

Parsnips, Carrots, Onions, &c. may now be sown in warm borders. If sown now they will come into early use next season, and enable you to anticipate your more tardy neighbors.

Planting Fruit Trees.—Whilever the ground remains open this may be done, provided the roots be surface covered with long manure to protect them frost.

Preservation of Cabbages.—Cabbages not already put away, should be taken up and covered from the weather without delay.

Gooseberries and Currants may, until the ground is frozen, be pruned and the cuttings set out with a certainty of their doing well; but to make assurance doubly sure, the ground should be well prepared both as regards spading and manuring.

Raspberries may, so long as the soil is open, be laid down.

Strawberry beds which may not have been cleaned, should be forthwith, and receive a dressing of well rotted manure, which should be dug in between the roots, say about two inches deep, taking care to disturb the roots as little as possible; then cover the alleys between the plants with long straw, taking care to confine the ends so as to prevent its being blown away.

Roses, Lilacs, Snow Balls, and almost every other description of hardy shrub flowers, may be planted out until the ground is frozen; but whenever planted this late, care should be taken to place around the roots a good thick covering of long stable manure, which, on the opening of spring, that is after the frosts are over, may be removed, or dug in aroand the roots, observing care not to injure them in so doing.

We have thus, by way of memoranda, briefly called your attention to a few of the many things which should, and may still be done in your garden, and shall conclude our monthly conversation, by impressing upon you the necessity of making daily visits therein, and seeing that every thing which ought to be, is done. Your presence is indispensable.

☞ And now, having concluded our suggestions as to what the Farmer ought to be thinking about and *doing*, during the Twelve Months, we commend him and his to the favor of Him who alone can give "the increase," no matter how well or by whom the planting and watering may be done—and wish all the enjoyment of many prosperous and happy New Years.

GENTLE READER—

You have reached the end of the FARMERS' BOOK, and here, according to our original design, should commence the FAMILY INSTRUCTOR; but this part of our plan we are compelled to abandon, from the necessity of occupying the entire volume in at least a well-intended endeavor to give all practicable *completeness* to the principles and details constituting the base and superstructure of our work. In this effort we trust that we shall not be considered unsuccessful by the intelligent reader, and we entreat all to suspend judgment, in regard to its merits, until they shall have given it a full and fair examination. In doing this it should be remembered that the various subjects succinctly brought to view in this work have furnished matter for many books, great and small, and that the compiler of the present volume only claims to have brought together, in a compact, convenient and pleasing form, the main points from an elucidation of which the agriculturist may derive valuable aid.—We would by no means have any of our readers to be content with this book alone, or suppose it to be sufficient for his purpose. It is a kind of *pioneer* in the cause—a "first book" in the agricultural school.—The Farmer who would avail himself of all the aid to be derived from books, and keep pace with the progress of discovery and improvement in his business, should not only make frequent additions to his library, but be in the regular receipt of at least one good Agricultural Periodical. Among the Books we would advise every Farmer to possess is a volume from which we have derived considerable aid, entitled, "THE AMERICAN FARMER'S INSTRUCTOR, AND PRACTICAL AGRICULTURIST," by F. S. WIGGINS—published by ORRIN ROGERS, Philadelphia. Among the Periodicals the Baltimore "AMERICAN FARMER" will meet every reasonable expectation.—To it we are indebted, chiefly, for the copious and *seasonable* hints to be found under the Monthly heads in the preceding pages. The Albany, Y. Y. "CULTIVATOR" is admitted on all hands to be without a superior in the country, in all that gives value to an Agricultural Journal. The Philadelphia "FARMERS' CABINET" also maintains a high rank. These three are monthly publications, at $1 per annum. If the reader should feel disposed to incur greater expense in providing his literary stock, "THE FARMERS' LIBRARY AND MONTHLY JOURNAL OF AGRICULTURE," published by GREELY & M'ELRATH, New-York, would give him full value for $5 expended in procuring it.—Or the Farmer who thinks he "can't afford" the expense or "the time" to procure and read a periodical devoted exclusively to agriculture, would find in a good Weekly Family Newspaper a very serviceable substitute, if choice be made of one in which, among its diversified contents, the "*Farmers' Department*" is judiciously supplied.—Among the Newspapers thus in part devoted, we name our own, the "REPOSITORY & WHIG," which, besides its ample space for the usual News, Miscellaneous, Political, Commercial and Business reading, will have a liberal portion of its columns devoted to Agriculture, &c. The "TELEGRAPH," published at Germantown, Pa. we can also recommend as possessing superior value in this particular, as well as in the other characteristics of a first-rate family newspaper.

Having indulged in these remarks and suggestions to our readers, we have only to observe, in conclusion, that our FAMILY INSTRUCTOR having been excluded, for the reason stated, we fully purpose to make *that* the purport and aim of another volume, at some future period, upon a more extended scale than at first contemplated, provided the success of the present work should encourage the undertaking. It is certain, however, that in one sense this book is strictly a *Family Instructor*—beginning at the head of the Farmer's family and having a lesson for every member of it, to the youngest, who can wield a hoe or feed a chicken. Besides, it closes with a neat presentation of a document which every American Citizen and Patriot must regard with peculiar feelings and be proud to render familiar to the sight and understanding of his children—the *Declaration of American Independence*, with *fac similes* of the signatures of that noble band of our forefathers who pledged their "lives, their fortunes and their sacred honor" for the security of the inestimable boon which now enables every one to dwell in peace and safety under the shadow of his own vine and fig tree.

NOVEMBER, 1845.

THE CULTIVATOR:

A MONTHLY PAPER, DEVOTED TO AGRICULTURE AND RURAL AFFAIRS.

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☞ All orders must be accompanied with the cash, and be addressed to Luther Tucker, Editor Cultivator, Albany, N. Y.

FLIGHT OF THE EAGLE AND HER YOUNG.—A BEAUTIFUL ILLUSTRATION.

In the book of Deuteronomy we have a beautiful and animated allusion to the eagle, and her method of exciting her eaglets to attempt their first flight, in that sublime and highly mystic composition called Moses' Song; in which Jehovah's care of his people, and method of instructing them how to aim at and attain heavenly objects, are compared to her proceedings upon that occasion. "As an eagle stirreth up her nest, fluttereth over her young, spreadeth abroad her wings, so the Lord alone did lead him." (Deut. xxii. 12.) The Hebrew lawgiver is speaking of their leaving their eyrie. Sir H. Davy had an opportunity of witnessing the proceedings of an eagle after they had left it. "I once saw a very interesting sight above the crags of Ben Nevis, as I was going on the 20th of August in the pursuit of black game. Two parent eagles were teaching their offspring, two young birds, the manœuvres of flight. They began by rising from the top of the mountain in the eye of the sun; it was about mid day and bright for this climate. They at first made small circles, and the young birds imitated them; they paused on their wings, waiting till they had made their first flight, and then took a second and larger gyration, always rising towards the sun, and enlarging their circle of flight, so as to make a gradually extending spiral. The young ones still slowly followed, apparently flying better as they mounted; and they continued this sublime kind of exercise till they became mere points in the air, and were both parents and children lost to our aching sight."

What an instructive lesson to Christian parents does this history read? How powerfully does it excite them to teach their children betimes to look towards Heaven and the Sun of Righteousness, and elevate their thoughts thither, more and more, on the wings of faith and love; themselves all the while going before them, and encouraging them by their own example.

Declaration of Independence.

IN CONGRESS,

JULY 4TH, 1776.

THE

UNANIMOUS DECLARATION

OF THE

THIRTEEN UNITED STATES OF AMERICA.

Original States.

MASSACHUSETTS.

Settled 1620, by English; 7500 sq'e miles; capital Boston; General Election 2d Monday in November; Legislature meet first Wednesday in January; Voters, one year's residence in the state, and have paid a state or county tax; sends Members of Congress, 12; Electors, 14.

When, in the course of human events, it becomes necessary for one people to dissolve the political bands which have connected them with another, and to assume among the powers of the earth, the separate and equal station to which the laws of nature and of nature's God entitle them, a decent respect to the opinions of mankind requires that they should declare the causes which impel them to the separation.

We hold these truths to be self-evident—that all men are created equal; that they are endowed by their Creator, with certain unalienable rights; that among these are life, liberty, and the pursuit of happi-

New States.

MAINE.

Settled 1630, by English; capital Augusta; General Election 2d Monday in September; Legislature meet first Wednesday in January; Voters must reside in the state three months before any election; sends Members of Congress, 8; Electors, 10.

Original States.

NEW HAMPSHIRE.

Settled 1623, by English; 9500 sq'e miles; capital Concord; General Election 2d Tues-in March; Legislature meets on the 1st Wednesday in June; Voters require no other qualification than to be twenty-one years of age; sends Members of Congress 5; Electors 7.

RHODE ISLAND.

Settled 1636, by English; 1360 sq. miles; capital Providence; General Election for gov. and senators in April; for represent's in April and August; Legislature meets 1st Wednesday in June and last Wed. in Oct.; Voters 3 mos. residence, and a freehold of $134; Mem. Congress 2; Electors 4.

CONNECTICUT.

Settled 1633, by English; 4760 sq. miles; capital N. Haven; Gen. Election 1st Monday in April; Legislature meet 1st Wed. in May; Voters, freehold of $7 per ann. or have done Military duty, paid a state tax, and taken the prescribed oath; sends members of Congress, 6; Electors, 8.

ness. That to secure these rights, governments are instituted among men, deriving their just powers from the consent of the governed; that whenever any form of government becomes destructive of these ends, it is the right of the people to alter or to abolish it, and to institute new government, laying its foundation on such principles, and organizing its powers in such form, as to them shall seem most likelty to effect their safety and happiness. Prudence, indeed, will dictate, that governments long established, should not be changed for light and transient causes; and, accordingly, all experience has shown that mankind are more disposed to suffer, while evils are sufferable, than to right themselves by abolishing the forms to which they are accustomed. But when a long train of abuses and usurpations, pursuing invariably the same object, evinces a design to reduce them under absolute despotism, it is their right, it is their duty, to throw off such government, and to provide new guards for their future security. Such has been the patient sufferance of these colonies; and such is now the necessity which constrains them to alter their former systems of government. The history of the present king of Great Britain, is a history of repeated injuries and usurpations, all having in direct object the establishment of an absolute tyranny over these states. To prove this, let facts be submitted to a candid world.

He has refused his assent to laws, the most wholesome and necessary for the public good.

He has forbidden his governors to pass laws of immediate and pressing importance, unless suspended in their operation until his assent should be obtained; and when

New States.

VERMONT.

Settled 1749, by English; 10,200 sq. miles; cap'l Montpelier; General Elect. first Tuesday in September; Legislature meet second Thursday in October; Voters to reside in the state one year; sends Members of Congress, 5; Electors, 7.

MICHIGAN.

Settled in 1670, by the French; contains 65,000 square miles; Indians, 30,000; capital, Detroit; Soil rich; Iron, copper, and lead mines abound; Qualifications, &c. not ascertained.

OHIO.

Settled 1788, by English; 39,000 sq. miles; cap. Columbus; Gen. Election 2d Tuesday in Oct.; Legislature meet 1st Monday in December; Voter, one year's residence in the state preceding elect'n and having paid state or county tax; sends Members of Congress, 19; Electors, 21.

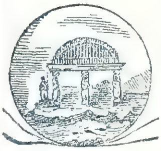
Original States.

NORTH CAROLINA.

Settled 1650, by English; 48,000 sq. miles; cap. Raleigh; Gen. Election in Aug.; Legislature meet 2d Monday in Nov.; Voter, citizen of the state 1 year, may vote for a member of the House of Commons, but must own 50 acres of land to vote for a senator; M. Cong. 13; Electors, 15.

SOUTH CAROLINA.

Settled 1689, by English; 24,000 sq. miles; cap. Columbia; Gen. Election 2d Monday in October; Legislature meet 4th Monday in November; Voter, resident of the state 2 years, and 6 mos. of the district where voting; sends Members of Congress, 9; Electors, 11.



GEORGIA.

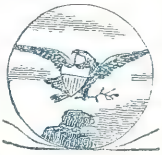
Settled 1733, by English; 60,000 sq. miles; capital Milledgeville; Gen. Elec. first Monday in Oct.; Legislature meet first Monday in Nov.; Voter, citizen of the state, and six mos. residence of county where voting, and paid all taxes: M. of Congress, 9; Electors, 11.

In every stage of these oppressions, we have petitioned for redress in the most humble terms; our repeated petitions have been answered only by repeated injury. A prince whose character is thus marked by every act which may define a tyrant, is unfit to be the ruler of a free people.

Nor have we been wanting in attention to our British brethren. We have warned them from time to time of attempts by their legislature, to extend an unwarrantable jurisdiction over us. We have reminded them of the circumstances of our emigration and settlement here. We have appealed to their native justice and magnanimity, and we have conjured them by the ties of our common kindred to disavow these usurpations, which would inevitably interrupt our connexions and correspondence. They, too, have been deaf to the voice of justice and consanguinity. We must, therefore, acquiesce in the necessity which denounces our separation, and hold them, as we hold the rest of mankind—enemies in war—in peace, friends.

We, therefore, the representatives of the United States of America, in general congress assembled, appealing to the SUPREME JUDGE of the world for the rectitude of our intentions do, in the name and by the authority of the good people of these colonies, solemnly publish and declare, that these United Colonies are, and of right ought to be, free and independent states—That they are absolved from all allegiance to the British crown, and that all political connexion between them and the state of Great Britain is, and ought to be, totally dissolved; and that, as free and independent states, they have full power to levy war, conclude peace, contract alliances, establish commerce, and to do all other acts and things which independent states may of right do. And for the support of this declaration, with a firm reliance on the protection of DIVINE PROVIDENCE we mutually pledge to each other our lives, our fortunes, and our sacred honor.

New States.



MISSISSIPPI.

Settled 1716, by the French; cap. Jackson; Gen. Elect'n 1st Monday in Aug.; Legislature meet 1st Monday in Nov.; Voter, citizen of the U. States, and 1 year's residence in this, and in county six months, and have done military duty, or paid taxes; Mem. Con. 2; Electors, 4.

ALABAMA.

Settled 1713, by the French; cap. Tuscaloosa; Gen. Elec'n 1st Monday in Aug.; Legislature meet fourth Monday in Oct.; Voter, citizen of the U. States, 1 year of this, and three months' residence in the county where he shall offer to vote; Mem. Cong. 5; Electors, 7.

LOUISIANA.

Settled 1699, by the French; 48,000 square miles; capital, N. Orleans; Gen. Elec'n 1st Monday in July; Legislature meet first Monday in January; Voter to reside 1 year in the county, and paid taxes within the last six months; Members of Congress, 3; Electors, 5.

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George Wythe
Richard Henry Lee
Josiah Bartlett
Wm Whipple
Saml Adams
Step. Hopkins
William Ellery
Roger Sherman
Charles Carroll of Carrollton
Francis Lightfoot Lee
Carter Braxton
Geo Clymer
Jas Smith

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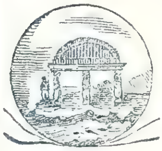
Original States.

NORTH CAROLINA.

Settled 1650, by English; 48,000 sq. miles; cap. Raleigh; Gen. Election in Aug.; Legislature meet 2d Monday in Nov.; Voter, citizen of the state 1 year, may vote for a member of the House of Commons, but must own 50 acres of land to vote for a senator; M. Cong. 13; Electors, 15.

SOUTH CAROLINA.

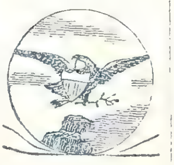
Settled 1689, by English; 24,000 sq. miles; cap. Columbia; Gen. Election 2d Monday in October; Legislature meet 4th Monday in November; Voter, resident of the state 2 years, and 6 mos. of the district where voting; sends Members of Congress, 9; Electors, 11.



GEORGIA.

Settled 1733, by English; 60,000 sq. miles; capital Milledgeville; Gen. Elec. first Monday in Oct.; Legislature meet first Monday in Nov.; Voter, citizen of the state, and six mos. residence of county where voting, and paid all taxes; M. of Congress, 9; Electors, 11.

New States.



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Th Jefferson
Benj^a Harrison
Tho^s Nelson jr.
Matthew Thornton
Rob^t Morris
Benjamin Rush
Benj^a Franklin
John Morton
Edward Rutledge
Tho^s Heyward Jun^r
Thomas Lynch Jun^r
Arthur Middleton
Caesar Rodney
Geo Read
Tho M:Kean

John Adams
Rob^t Treat Paine
Elbridge Gerry
W^m Floyd
Phil. Livingston
Fran^s Lewis
Lewis Morris
Sam^{el} Huntington
W^m Williams
Oliver Wolcott
Rich^d Stockton
Jn^o Witherspoon
Fra^s Hopkinson
John Hart
Abra Clark

John Hancock
Button Gwinnett
Lyman Hall
Geo Walton.
W^m Hooper
Joseph Hewes
John Penn
W^m Paca
Tho^s Stone
Geo Taylor
James Wilson
Geo Ross
Samuel Chase

George Wythe
Richard Henry Lee
Josiah Bartlett
W^m Whipple
Sam^l Adams
Step. Hopkins
William Ellery
Roger Sherman
Charles Carroll of Carrollton
Francis Lightfoot Lee
Carter Braxton
Geo Clymer
Ja^s Smith

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